

GURU KASHI UNIVERSITY



Bachelor of Computer Applications

Session : 2022-23

Department of Computer Applications

PROGRAMME LEARNING OUTCOMES

After completion the program student will be able to

- Apply exploration to study and analyze problems in different areas of information technology.
- Analyze and evaluate computing systems, processes, and technologies to identify areas for improvement and optimize their performance.
- Communicate effectively with different stakeholders using a variety of modes and techniques, including written reports, oral presentations, and visual aids.
- Contribute to progressive community and society in comprehending computing activities by writing effective reports, designing documentation, making effective presentation, and understand instructions.
- Demonstrate proficiency in programming languages, software development tools, and other relevant technologies.
- Conduct independent research and engage in lifelong learning to keep up-to-date with emerging trends and technologies in computer science.

Programme Structure

Semester –I						
Course Code	Course Title	Type of Course				
			L	T	P	Credits
BCA101	Fundamentals of Computer	Core	4	0	0	4
BCA102	Problem solving using C	Core	4	0	0	4
BCA103	Internet Concepts and Web Designing	Technical skill	3	0	0	3
BCA104	Communication skills	Compulsory Foundation	1	0	0	1
BCA105	S/W Lab-I (Fundamentals of Computer)	Technical skill	0	0	6	3
BCA106	S/W Lab-II (Problem solving using C)	Technical skill	0	0	4	2
BCA107	PC assembling & Troubleshooting Laboratory	Technical skill	0	0	6	3
BCA199		MOOC				
Disciplinary Elective- I (Any one of the following)						
BCA109	Electronic Commerce and Governance	Discipline Elective- I	3	0	0	3
BCA110	LINUX Administration					
Total			15	0	16	23

Semester- II						
Course Code	Course Title	Course Type				
			L	T	P	Credits
BCA201	Data Structures	Core	4	0	0	4
BCA202	Programming using C++	Core	4	0	0	4
BCA203	Web designing using ASP.NET	Technical skill	4	0	0	4
BCA204	S/W Lab-III (Programming Using C++)	Technical skill	0	0	6	3
BCA205	S/W Lab-IV (Data Structures)	Technical skill	0	0	6	3
BCA206	S/W Lab-V (Web designing using ASP.NET)	Technical skill	0	0	4	2
Disciplinary Elective- II (Any one of the following)						
BCA209	Introduction to Cloud Computing	Discipline Elective- II	3	0	0	3
BCA210	Fundamentals of Information Security					
Value Added Course(For other Departments also)						
BCA208	Numerical Aptitude and Reasoning Ability	VAC	2	0	0	2
Total			17	0	16	25

Semester-III						
Course Code	Course Title	Course Type				
			L	T	P	Credits
BCA301	Discrete Mathematics	Core	4	0	0	4
BCA302	Operating Systems	Core	4	0	0	4
BCA303	Digital Electronics	Technical skill	3	0	0	3
BCA304	Environmental Science	Compulsory Foundation	1	0	0	1
BCA305	S/W Lab-VI (Operating Systems)	Technical skill	0	0	4	2
BCA306	H/W Lab-VII (Digital Electronics)	Technical skill	0	0	4	2
BCA307	Institutional Training (4 weeks)	Technical skill	NA	NA	NA	4
BCA399		MOOC				
Disciplinary Elective- III (Any one of the following)						
BCA308	Digital Marketing	Discipline Elective- III	3	0	0	3
BCA309	Electronic Devices					
Open Elective Course						
		OEC	2	0	0	2
Total			17	0	12	25
Open Elective Courses (For other Departments)						
BCA310	Digital Marketing	OEC	2	0	0	2

Note: * After Second Semester during summer vacation (only for regular students, Not for Leet Students)

Semester-IV						
Course Code	Course Title	Course Type				
			L	T	P	Credits
BCA401	Computer System Architecture	Core	4	0	0	4
BCA402	Database Management Systems	Core	4	0	0	4
BCA403	Programming using PHP	Technical skill	3	0	0	3
BCA404	S/W Lab-VIII (Programming using PHP)	Technical skill	0	0	6	3
BCA405	S/W Lab-IX (Workshop on Multimedia)	Technical skill	0	0	4	2
BCA406	S/W Lab-X (Database Management Systems)	Technical skill	0	0	4	2
BCA417	Gender Equality	Value Added Course	2	0	0	2
Disciplinary Elective- IV (Any one of the following)						
BCA407	Cyber Law	Discipline Elective- IV	3	0	0	3
BCA408	Ethical Hacking					
Total			14	0	14	23

Semester-V						
Course Code	Course Title	Course Type				
			L	T	P	Credits
BCA501	Computer Networks	Core	4	0	0	4
BCA502	Software Engineering	Core	4	0	0	4
BCA503	Introduction to Java	Technical skill	4	0	0	4
BCA504	S/W Lab-XI (Java)	Technical skill	0	0	6	3
BCA505	Institutional Training (6 weeks)	Technical skill	0	0	6	3
BCA506	S/W Lab-XII (Major Project)	Technical skill	0	0	4	2
BCA507	Entrepreneurship Development	Entrepreneurship Skill	2	0	0	2
BCA599		MOOC				
Disciplinary Elective-V (Any one of the following)						
BCA508	Big Data	Discipline Elective-V	3	0	0	3
BCA509	Data Warehouse and Mining					
Total			17	0	16	25

Semester-VI						
Course Code	Course Title	Course Type				
			L	T	P	Credits
BCA601	Computer Graphics	Core	4	0	0	4
BCA602	Programming using Python	Core	4	0	0	4
BCA603	Basics of Research	Research	4	0	0	4
BCA604	S/W Lab-XIII (Computer Graphics)	Technical skill	0	0	4	2
BCA605	S/W Lab-XIV (Programming using Python)	Technical skill	0	0	4	2
BCA606	Community Based Field Project	Skill Based	0	0	8	4
Disciplinary Elective-VI (Any one of the following)						
BCA607	Artificial Intelligence	Discipline elective-VI	3	0	0	3
BCA608	Soft Computing					
Disciplinary Elective-VII (Any one of the following)						
BCA609	Android Programming	Discipline elective-VII	3	0	0	3
BCA610	Theory of Computation					
Total			18	0	16	26
Grand Total			98	0	90	145

Evaluation Criteria for Theory Courses

- A. Continuous Assessment: [25 Marks]
 - i. CE-1 (10 Marks)
 - ii. CE-2 (10 Marks)
 - iii. CE-3 (5 Marks)

(For each CE, Conduct Surprise Test, Quiz, Assignment(s), Term paper etc.)

- B. Attendance (5 marks)
- C. Mid Semester Test-1[30 Marks]
- D. MST-2[20Marks]
- E. End-Term Exam[20 Marks]

Evaluation Criteria for other courses has been given separately with the respective courses

SEMESTER-I**Course Title: Fundamentals of Computer****Course Code: BCA101**

L	T	P	Credits
4	0	0	4

Total Hours: 60**Course Outcomes**

On the completion of the course the students will be able to

1. Classify binary, hexadecimal and octal number system and their arithmetic operations.
2. Analyze the concept of computer devices and recognition of the basic terms used in computer programming.
3. Identify and learn the details of the components of a personal computer system.
4. Demonstrate the functions of computer programming languages.
5. Utilize the Internet Web resources.

Course Content**UNIT I****14****hours**

1. Computer Fundamentals: Block diagram of a computer, characteristics of computers and generations of computers.
2. Number System: Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.
3. Binary Arithmetic: Addition, subtraction and multiplication.
4. Computer Codes: weighted and non-weighted code, BCD, EBCDIC, ASCII, Unicode.

UNIT II**16****hours**

1. Input Devices: Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Speech Recognition Devices, Optical Recognition devices – OMR, OBR, OCR
2. Output Devices: Monitors, Printer and its Types.
3. Memories: Units of Memory, Main Memories - RAM, ROM and Secondary Storage Devices - Hard Disk, Compact Disk, DVD.
4. Introduction to Computer Terms like Hardware, Software

UNIT III**14 hours**

1. Computer languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, Assembling, System Software, Application Software.
2. MS Word: Introduction, Creating & Editing Word Document. Saving Document, Working with Text: Selecting, Formatting, Aligning, Finding Replacing Text, Bullets & Numbering, Header & Footer, Working with Tables, Properties Using spell checker, Grammar, Auto Correct Feature, Graphics: Inserting Pictures, Clip art, Drawing

Objects, Setting page size and margins; Printing documents, Mail-Merge.

UNIT IV

16 hours

1. MS-Excel: Environment, Creating, Opening & Saving Workbook, Range of Cells, Formatting Cells, Functions: Mathematical, Logical, Date Time, Auto Sum, Formulas. Graphs: Charts. Types & Chart Tool Bar, Printing: Page Layout, Header and Footer Tab.
2. MS PowerPoint: Environment, Creating and Editing presentation, Auto content wizard using built-in templates, Types of Views: Normal, Outline, Slide, Slide Sorter, Slide Show, Creating, customized templates; formatting presentations, AutoShapes, adding multimedia contents, printing slides
3. Internet: Basic Internet terms: Web Page, Website, Home page, Browser, URL, Hypertext, Web Server, Applications: WWW, e-mail, Instant Messaging, Videoconferencing.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Sinha P.K. and Sinha P. (2002). Foundations of Computing, First Edition, BPB.
- Sanders D.H. (1988). Computers Today, Fourth Edition, McGraw Hill.
- Rajaraman V. (1996). Fundamentals of Computers, Second Edition, Prentice Hall of India, New Delhi.
- Jain Satish (1999). Information Technology, Paperback Edition, BPB.

Web Sources

- <https://byjus.com/govt-exams/computer-fundamentals/>
- <https://www.chtips.com/computer-fundamentals/what-is-computer-fundamentals/>
- https://www.tutorialspoint.com/computer_fundamentals/index.htm
- <https://www.javatpoint.com/computer-fundamentals-tutorial>

Course Title: Problem Solving using C

Course Code: BCA102

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Acquire knowledge about algorithms and flowchart for solving problems using computers.

2. Demonstrate the use of loops and decision-making statements to solve the problem.
3. Implement different Operations on arrays and will use functions to solve the given problem.
4. Enrich the students in logic development required for programming.
5. Help the students to build carrier in various branches of software development

Course Content

UNIT I

16

hours

1. Introduction: ANSI C standard, Overview of Compiler and Interpreters, Structure of C Program, Programming rules, Execution
2. Basic structure of C program: Character set, Identifiers and keywords, constants, variable, Scope Rules, Data types, input and output, type conversion, Implicit Type Conversion, Explicit Type Conversion

UNIT II

14 hours

1. Operators and expressions: Arithmetic, Unary, Logical and Relational operators, assignment operators, Conditional operators, bitwise operator and its operations, type conversion. Library functions.
2. Input/ Output in C: Formatting input & output functions.
3. Decision making statements – if, else, else if, nested if else
4. Control statements: branching, looping using For, While and Do-While statements, nested control structures, switch, break and continue statements.

UNIT III

18 hours

1. Arrays: Definition, declaration, assignment, one dimensional and two dimensional arrays.
2. Strings: input/output of strings, string handling functions, table of strings.
3. Pointers: pointer data type, pointer declaration, initialization, accessing values using pointers Pointer arithmetic, Array of pointers, Pointer to pointer, passing pointers to functions in C, NULL Pointer, typedef vs #define
4. Functions: prototype, definition and call, formal and actual arguments, methods of parameter passing to functions, recursion versus iteration.

UNIT IV

12 hours

1. Structures and unions: using structures and unions, comparison of structure with arrays and union.
2. Dynamic Memory Allocation in C: Memory Management in C, Static Memory Allocation, Dynamic Memory Allocation, malloc(), calloc(), free(),realloc()
3. Files: opening and closing files, Basic I/O operation on files.
4. Storage Classes: automatic, external, static and register variables.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Kanetkar, Y. (2018). Let us C. BPB publications.
- Hanly, J. R., &Koffman, E. B. (2007). Problem solving and program design in C. Pearson Education India.

Web Sources

- <https://hamrocsit.com/note/c-program/problem-solving-computer/>
- <https://learnprogramo.com/problem-solving-through-programming-in-c-1/>
- <https://www.includehelp.com/c-programming-examples-solved-c-programs.aspx>
- <https://www.studocu.com/in/document/bengaluru-north-university/bca/problem-solving-techniques-using-c/16264070>

Course Title: Internet Concepts and Web Designing

Course Code: BCA103

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Develop basic programming skills using Java script and JQuery.
2. Learn techniques of responsive web design, including media queries.
3. Demonstrate the principles of creating an effective web page, including an in-depth consideration of information architecture.
4. Embed social media content into web pages.
5. Develop skills in digital imaging (Adobe Photoshop)

Course Content**UNIT I****11 hours**

1. Web Development: World Wide Web (WWW), History, Web site, Web page, Static Website and Dynamic Website
2. Server: Web Server, Web Client/ Browser
3. Introduction: HTML Documents, Elements, type of Elements, Special Character elements Structural elements of HTML documents , Titles, Header tags, Body tags, Formatting tags, Ordered list ,Unordered lists, Definition lists, Formatting HTML Documents

UNIT II**10 hours**

1. Managing images in HTML: Image format (quality, size, type), Importing images (scanners), Tags used to insert images, Frames,

Tables in HTML, Internal Links, External Links, Link Tags, Links with images and buttons, Links that send email messages, Text fonts, Sensitive Images, Page

2. Forms : Form Tag , Attributes of Form , POST and GET Method , Fieldset and Legend ,Text input, Text area ,Checkbox and Radio Button , Dropdown, List , File Upload , Submit, Image, Normal, Reset Button.
3. Cascading Style Sheets: ways of inserting a style sheet:
4. External style sheet, internal style sheet, Inline style CSS, Id and Class, CSS Properties,Text Properties ,Background Properties ,Box Properties , List Properties , Border Properties , Positioning Properties.

UNIT III**12 hours**

1. Introduction to JavaScript: How & Where to put the JavaScript Code, JavaScript Statements, Comments, Variables, Operators, Conditional Statements, Control Statements, pop up boxes, Functions
2. Introduction to JQuery : Introduction to jQuery , jQuery Features ,Installing jQuery , jQuery Syntax , jQuery Ready Function , jQuery Selectors , jQuery Actions

UNIT IV**12 hours**

1. Purchasing a Domain Name & Web Space: Domain Name & Web Space, Getting a Domain Name & Web Space (Purchaser Free), Uploading the Website to Remote Server.
2. Internet: Basic Concepts, Communicating on the Internet, Internet Domains, Establishing connectivity to the Internet, Client IP Address, IP Address.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Rashid, M. M., & Islam, M. N. (2014). CODE: DCSA 2303 TITLE: Internet Technology and Web Designing.
- McEwen, A., & Cassimally, H. (2013). Designing the internet of things. John Wiley & Sons.

Web Sources

- https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
- <https://www.geeksforgeeks.org/the-internet-and-the-web/>
- <https://www.attitudetallyacademy.com/internet-concepts-web-design>
- <https://www.javatpoint.com/internet>

Course Title: Communication Skills

L	T	P	Credits
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Course Outcomes

On the completion of the course the students will be able to

1. Take a course overview of prerequisites to Business Communication and awareness of appropriate communication strategies.
2. Formulate an outline for effective Organizational Communication.
3. Summarize the information, ideas, concepts and opinions from a variety of sources.
4. Attain the competence in oral, written, and visual communication.
5. Learn the correct practices about the strategies of Effective Business writing.

Course Content**UNIT I****4 hours**

1. English Language: Sentence, Sentence Formation, Parts of speech, Tenses, Active passive voice, Direct/Indirect speech, Vocabulary.
2. Business Communication: Definition, Types, Medias, Objectives, Modals, Process and Barriers to communication in an organization & ways to handle and improve barriers of business communication.

UNIT II**4 hours**

1. Oral Communication: Verbal communication and its types, Non-Verbal Communication and its types.
2. Listening Skills: Types of listening and Traits of a good listener, Note taking, barriers to listening & remedies to improve listening barriers, Cambridge Tests of listening.

UNIT III**3 hours**

1. Reading Skills: Newspaper / Magazine/ Article Reading from English Newspaper, Cambridge Readings.

UNIT IV**4 hours**

1. Writing Skills: Essay Writing, Letter writing: Formal, informal and Job –application, Resume writing.
2. Presentation Skills: Presentation Purpose in Business world, how to Prepare PPT, Tips for the required body language while delivering the presentation in front of third party.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Kumar, S., & Lata, P. (2011). Communication skills. Oxford University Press.
- Training, M. T. D. (2012). Effective communication skills. Bookboon.

- Hargie, O. (Ed.). (1986). The handbook of communication skills (p. 37). London: Croom Helm.

Web Sources

- <https://haiilo.com/blog/top-5-communication-skills-and-how-to-improve-them/>
- <https://corporatefinanceinstitute.com/resources/management/communication/>
- <https://www.thebalancemoney.com/communication-skills-list-2063779>
- <https://www.skillsyouneed.com/ips/communication-skills.html>

Course Title: S/W Lab-I(Fundamentals of Computer)

Course Code: BCA105

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Compose, format and edit a word document.
2. Edit and forward email messages (with or without attachments).
3. Navigate and work on research field through the internet.
4. Utilize the MS PowerPoint with custom animation and slide orientation.
5. Perform coding in different programs with practical knowledge.

Course Content

UNIT I

12 hours

1. MS Windows: Familiarizing with windows operating system; using built-in accessories; managing files and folders using windows explorer; working with control panel; installing hardware and software, Installation of MS Office.

UNIT II

9 hours

1. MS Word: Using word to create Resume Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.
2. Creating an Assignment Features to be covered: - Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
3. Creating a Newsletter Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

UNIT III

11 hours

1. MS Excel: Creating a Scheduler Features to be Covered: - Gridlines, Format Cells, Summation, auto fill, Formatting Text.
2. Calculations Features to be covered :- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP.
3. Performance Analysis Features to be covered: - Split cells, freeze panes, group and outline, sorting.

UNIT IV**13 hours**

1. MS Power Point: Salient features of Power-point, File, Edit, View, Insert, Format, Tools, and Slide Show. Topics covered includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts
2. Internet: Navigating with Internet Explorer; surfing the net, using search engines; using email.

Course Title: S/W Lab-II (Problem Solving using C)

L	T	P	Credits
0	0	4	2

Course Code: BCA106**Total Hours: 60****Course Outcomes**

On the completion of the course the students will be able to

1. Identify the difference between the top-down and bottom-up approach.
2. Develop a given program using the basic elements like control statements.
3. Debug the programming code.
4. Implement the Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
5. Analyze an algorithmic solution for a given problem.

Course Contnt

1. Write a program to display your name.
2. Write another program to print message with inputted name.
3. Write a program to add two numbers.
4. Write a program to find the square of a given number
5. Write a program to calculate the average of three real numbers.
6. Write a program to find ascii value of a character
7. Write a program to find the size of int, float, double and char
8. Write a program to compute quotient and remainder
9. Write a program to accept the values of two variables.
10. Write a program using various unformatted input functions
11. Write a program to find area of rectangle and print the result using unformatted output functions
12. Write a program to find the larger of two numbers.
13. Write a program to find greater of three numbers using nested if.
14. Write a program to find whether the given number is even or odd.
15. Write a program to generate multiplication table using for loop

16. Write a program to generate multiplication table using while loop
17. Write a program to make a simple calculator using switch...case
18. Write a program to find whether the given number is a prime number.
19. Write a program using function to find the largest of three numbers
20. Write a program using function to print first 20 numbers and its squares.
21. write a program to find the factorial of a given number.
22. Write a program to print the sum of two matrices
23. write a program to find the length of a string
24. Write a program to copy string using strcpy()
25. Write a program to compare a string
26. Write a program to reverse a string
27. Write a program to reverse a string
28. Write a program to multiply two numbers using pointers.
29. write a program to display address of variable using pointers
30. write a program to show the memory occupied by structure and union.
31. write a program to create student i-card using a structure
32. Write a program to read data from a file from a file
33. Write a program to save employee details in a file using file handling

Course Title: Pc Assembling & Troubleshooting Laboratory

Course Code: BCA107

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Knowledge about the motherboard, bios and storage device features and its functions.
2. Install OS (Linux/windows) on their systems.
3. Get knowledge about ports and wires.
4. Install system and software applications.
5. Get knowledge about Create disk partitioning.

Course Content

1. Introduction of Hardware and Software/components of computer.
2. Mother boards, Chipsets & Microprocessor concept & latest available in market.
3. Basics &Types of Floppy drive/HDD/DVD/RAM /SMPS//BIOS.
4. Assembling of different parts of computers.
5. Knowing ports, wires attached in the Computer.
6. Installation of OS(Linux/Windows).
7. Installation of application and utility software.
8. Networking Basics: Different types of Topologies and their configuration.
9. Types of Switches, I/O Sockets.
10. Creation of Cross Wires and Direct Cables.

11. IP & Setting up a computer on LAN

Course Title: Electronic Commerce and Governance**Course Code: BCA109**

L	T	P	Credits
3	0	0	3

Total Hours: 45**Course Outcomes**

On the completion of the course the students will be able to

1. Discuss about the basic concepts and technologies used in the field of E-Commerce and Governance.
2. Gain the knowledge about the different types of Electronic Payment Systems.
3. Define various types of Governance Process Models.
4. Knowledge about the ethical, social and security issues of online transactions.
5. Describe the Internet trading relationships including Business to Consumer, Business-to Business, Intra-organizational

Course Content**UNIT I****12 hours**

1. Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce.
2. Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

UNIT II**10 hours**

1. E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

UNIT III**11****hours**

1. E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nationwide networking in e-governance, e-seva.

UNIT IV**12 hours**

1. E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Winn, J. K., & Wright, B. (2000). The law of electronic commerce. Wolters Kluwer.
- United States. White House Office. (1997). A framework for global electronic commerce. White House.
- Andrea, G. (Ed.). (2002). Development Centre Studies Electronic Commerce for Development. OECD Publishing.

Web Sources

- <https://simplycoding.in/e-commerce-and-e-governance-notes/>
- <https://study.com/academy/lesson/what-is-e-government-commerce-definition-examples.html>
- <https://www.geeksforgeeks.org/e-governance/>
- https://web.archive.org/web/20160103054145/http://www.isoc.org/inet96/proceedings/g7/g7_3.htm

Course Title:Linux Administration

Course Code: BCA110

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Work with various Linux command and understand file hierarchical structuring.
2. Administrate user, manage and configure packages in Linux.
3. Monitor system performance and network activities and configure the various internet services
4. Effectively use software development tools including libraries, preprocessors, compilers, linkers, and make files.
5. Comprehend technical documentation, prepare simple readable user documentation and adhere to style guidelines and collaborate in teams on system tasks.

Course Content

UNIT I

9 hours

1. Introduction: Linux: The Operating System: Linux Distributions, Difference Between Linux and Windows, Separation of the GUI and the Kernel, Understanding Linux Kernel, Installing Linux in a Server

Configuration, Booting and Shutting Down Process, Concept of Root, Basic commands, working with vi Editor.

UNIT II **11 hours**

1. Understanding files and File System: Understanding Files and Directories in Linux, File Structure and hierarchy, File Permissions, File Management and Manipulation, Managing File System
2. Managing Packages & Users: Installing and removing Software in Linux, Getting and Unpacking the Package, Configuring the Package, Compiling the Package, Installing the Package, Managing Users and Groups

UNIT III **12 hours**

1. DNS: Installing a DNS Server, Configuring a DNS Server, DNS Records Types, Setting Up BIND Database Files, The DNS Toolbox, Configuring DNS Clients.
2. Web Server: Understanding the HTTP Protocol, Installing the Apache HTTP Server, Starting Up and Shutting Down Apache, Configuring Apache

UNIT IV **13 hours**

1. E-Mail Server: Understanding SMTP, Installing the Postfix Server, Configuring the Postfix Server, Running the Server, POP and IMAP Basics, Installing the UW-IMAP and POP3 Server
2. Samba Server: The Mechanics of SMB, Samba Administration, Using SWAT, Creating a Share, Mounting Remote Samba Shares, Creating Samba Users, Using Samba to Authenticate Against a Windows Server.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Wale, S. (2008). Linux Administration: A Beginner's Guide. McGraw-Hill.
- Nemeth, E., Snyder, G., Hein, T. R., Whaley, B., & Mackin, D. (2018). UNIX and Linux system administration handbook. USENIX Open Access Policy, 59.
- Petersen, R. (2007). Linux: The Complete Reference (With Cd). Tata McGraw-Hill Education.
- Dulaney, E. (2018). Linux All-in-one for Dummies. John Wiley & Sons.

Web Sources

- <https://www.geeksforgeeks.org/what-is-linux-system-administration/>
- https://www.tutorialspoint.com/linux_admin/index.htm

- <https://www.educative.io/answers/what-is-the-linux-system-administration>
- <https://www.javatpoint.com/linux-system-admin-commands>

SEMESTER-II

Course Title: Data Structures
Course Code: BCA201

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Apply appropriate constructs of Programming language, coding standards for application development
2. Select appropriate data structures for problem solving and programming
3. Illustrate the outcome of various operations on data structures.
4. Identify appropriate searching and/or sorting techniques for wide range of problems and data types.
5. Differentiate between various types of data structures.

Course Content

UNIT I

14

hours

1. Introduction to Data Structures: Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm, Introduction and Definition of Data Structure, Classification of Data, Arrays, Various types of Data Structure, Static and Dynamic Memory Allocation, Function, Recursion.
2. Arrays, Pointers and Strings: Introduction to Arrays, Definition, One Dimensional Array and Multi-Dimensional Arrays, Pointer, Pointer to Structure, various Programs for Array and Pointer. Strings. Introduction to Strings, Definition, Library Functions of Strings.

UNIT II

16

hours

1. Stacks and Queue: Introduction to Stack, Definition, Stack Implementation, Operations of Stack, Applications of Stack and Multiple Stacks. Implementation of Multiple Stack Queues, Introduction to Queue, Definition, Queue Implementation, Operations of Queue, Circular Queue, De-queue and Priority Queue.

UNIT III

14 hours

1. Linked Lists and Trees: Introduction, Representation and Operations of Linked Lists, Singly Linked List, Doubly Linked List, Circular Linked List, and Circular Doubly Linked List.
2. Trees: Introduction to Tree, Tree Terminology Binary Tree, Binary Search Tree, Strictly Binary Tree, Complete Binary Tree, Tree Traversal, Threaded Binary Tree, AVL Tree B Tree, B+ Tree.

UNIT IV

16 hours

1. Graphs, Searching, Sorting and Hashing Graphs: Introduction, Representation to Graphs, Graph Traversals Shortest Path Algorithms.
2. Searching and Sorting: Searching, Types of Searching, Sorting, Types of sorting like quick sort, bubble sort, merge sort, selection sort.
3. Hashing: Hash Function, Types of Hash Functions, Collision, Collision Resolution Technique (CRT), Perfect Hashing

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Hubbard, J. R. (2007). *[Introduction to] Schaum's Outline of Data Structures with Java*. McGraw-Hill.
- Horowitz, E., & Sahni, S. (1976). *Fundamentals of data structures* (Vol. 1982). Potomac, MD: Computer science press.
- Wirth, N. (1985). *Algorithms & data structures*. Prentice-Hall, Inc..
- Tarjan, R. E. (1983). *Data structures and network algorithms*. Society for industrial and Applied Mathematics.

Web Search

- <https://www.geeksforgeeks.org/data-structures/>
- <https://www.javatpoint.com/data-structure-tutorial>
- <https://www.programiz.com/dsa/data-structure-types>
- <https://www.techtarget.com/searchdatamanagement/definition/data-structure>

Course Title: Programming using C++

Course Code: BCA202

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Discuss about the programming techniques to solve problems or errors in the C++ programming language.
2. Compare the procedural and Object-Oriented paradigms.
3. Attain the conceptual knowledge of array and string.
4. Describe the constructor and class member function.
5. Analyze the inheritance with the understanding of early binding and late binding.

Course Content

UNIT I

14

hours

1. Evolution of OOP: Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over its predecessor paradigms.

2. Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, code Extensibility and Reusability, User defined Data Types. Introduction to C++: Identifier and keywords, Constants, Operators

UNIT II**16****hours**

1. Pointers: Pointer Operations, Pointer Arithmetic, Pointers and Arrays, Multiple indirections, Pointer to functions.
2. Function : Prototyping, Definition and Call, Scope Rules, Parameter Passing Value, by address and by reference, Functions returning references, Const Functions, recursion, function overloading, Default Arguments, Const Arguments.
3. Classes, Objects and Members: Class Declaration and Class Definition, Defining member functions, Defining Object, making functions inline, Members access control, Nested Classes, This Pointer. Object as function arguments, array of objects, functions returning objects, const members and member functions. Static data members and static member functions, Friend functions and Friend classes.

UNIT III**14 hours**

1. Constructors: Properties, types of constructors (Default, parameterized and copy), Dynamic constructors, Multiple constructors in classes.
2. Destructors: Properties, Virtual destructors, Destroying objects, Rules for constructors and destructors, Array of objects. Dynamic memory allocation using new and delete operators.
3. Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function, function redefining, constructors in derived class. Types of inheritance: Single, Multiple, Multi level and Hybrid, Types of base classes: Direct, Indirect, Virtual, Abstract, Code Reusability.

UNIT IV**16 hours**

1. Polymorphism: Methods of achieving polymorphic behavior. Polymorphism with pointers, virtual functions, late binding, pure virtual functions and abstract base class. Difference between function overloading, redefining and overriding.
2. Operator overloading: Overloading binary operator, overloading unary operators, rules for operator overloading, operator overloading using friend function. Function overloading, early binding.
3. Files and streams: Classes for file stream operations, opening and closing of files, reading and writing files.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching,

Collaborative Learning.

Suggested Readings

Balagurusamy, E., Balagurusamy, E., & Balagurusamy, E. (2001). *Object oriented programming with C++*. Tata McGraw-Hill Publishing Company.

Pohl, I. (1993). *Object-oriented programming using C++*. Benjamin-Cummings Publishing Co., Inc..

Dewhurst, S. C., & Stark, K. T. (1989). *Programming in C++*. Prentice-Hall, Inc..

Lafore, R. (1997). *Object-oriented programming in C++*. Pearson Education.

Web Search

- https://www.w3schools.com/cpp/cpp_intro.asp#:~:text=C%2B%2B%20is%20an%20object%2Doriented,fun%20and%20easy%20to%20learn!
- <https://www.geeksforgeeks.org/c-plus-plus/>
- <https://www.programiz.com/cpp-programming>
- <https://www.javatpoint.com/cpp-tutorial>

Course Title: Web Designing using ASP.NET

Course Code: BCA203

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Learn the language of web: HTML/CSS.
2. Apply the principles of creating an effective web page.
3. Summarize managing web page styles using java script and CSS.
4. Create the HTML, CSS and JavaScript components of Bootstrap work.
5. Develop a fully functioning website and deploy on a web server.

Course Content

UNIT I

15 hours

1. Introduction HTML Documents, various Tags, Text Elements, Tag Elements, Special Character elements Structural elements of HTML documents: Header tags, Body tags, Paragraphs, Titles, Numbered list, Non, Numbered lists, Definition lists, Formatting HTML Documents
2. Managing images in Html: Image format (quality, size, type), Importing images (scanners), Tags used to insert images, Frames, Tables in HTML, Internal Links, External Links, Link Tags, Links with images and buttons, Links that send email messages Text fonts, Sensitive Images, Tip tables, Page.

UNIT II

15

hours

1. Cascading Style Sheets: ways of inserting a style sheet:
 - External style sheet
 - Internal style sheet
 - Inline style

CSS Id and Class, Inheritance in CSS

UNIT III

15 hours

1. Bootstrap: Introduction to Bootstrap, Bootstrap 3 vs. Bootstrap 4 , Setting up Environment , Bootstrap 4 Basic Template, Containers, container-fluid, Container Padding , Grid Classes , Display Headings, More Typography Classes , Text Colors, Carousel, Cards, Buttons,
2. Button group, Nav bar , Tooltip

UNIT IV

15 hours

1. JavaScript Introduction: JavaScript Syntax, JavaScript Variables, JavaScript Data Types, JavaScript Operators, JavaScript Comments, JavaScript if else and else if , Loop ,JavaScript Functions, JavaScript Events, Arrow Function
2. JavaScript HTML DOM: JavaScript HTML DOM methods, Finding HTML Elements, Changing HTML Elements, Adding and Deleting Elements, Changing the Value of an Attribute, Changing CSS, DOM Event Listener, Add an Event Handler to an Element JSON, Exchanging Data, Sending Data, Receiving Data, Storing Data

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

MacDonald, M., & Szpuszta, M. (2007). *ASP. NET 3. 5 in C# 2008*. Apress
 LP.Hart, C., Kauffman, J., Sussman, D., & Ullman, C. (2006). *Beginning ASP. NET 2.0 with C*. John Wiley & Sons.

MacDonald, M., Szpuszta, M., Lair, R., & Lefebvre, J. (2005). *Pro Asp. net 2.0 in C# 2005* (Vol. 1288). New York, NY: Apress.

Web Search

- <https://dotnet.microsoft.com/en-us/apps/aspnet/web-apps>
- <https://www.tutorialspoint.com/asp.net/index.htm>
- https://www.w3schools.com/asp/webpages_intro.asp
- <https://www.geeksforgeeks.org/introduction-to-asp-net/>

Course Title: S/W Lab-III (Programming using C++)

Course Code: BCA204

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Classify the object oriented concepts and their implementation.
2. Use the concepts of array and string using C++.
3. Implement a given program solved by C++.
4. Grasp the concept of implementing the constructors with classes.
5. Apply algorithmic problems including inheritance, and polymorphism with the understanding of early and late binding, usage of exception handling, generic programming.

Course Content

1. Write a program to print
 - 1
 - 12
 - 123
 - 1234
 - 123452
2. Write a program to print
 - 1
 - 22
 - 333
 - 4444
 - 55555
3. Write a program generates the prime numbers.
4. Write a program addition of two square matrices.
5. Write a program multiplication of two matrices.
6. Write a program to subtract two matrices.
7. Write a program to find whether the number is even, odd.
8. Write a program to find greatest out of three number using &&operators.
9. Write a program to find whether the number is palindrome or not.
10. Write a program to print even number Series.
11. Write a program to print odd number series.
12. Write a program to print prime number Series.
13. Write a program to find whether the number is prime or composite.
14. Write a program to find length of given Character string.
15. Write a program to find the reverse of number.
16. Write a program to add string2 into string1.
17. Write a program to compare two strings.
18. Write a program to copy sring2 intostring1.
19. Write a program to find volume of (I) cylinder (II) cone.
20. Write a program to find factorial of number.
21. Write a program to add, multiply, subtract, divide two numbers using nested if-else in C++.
22. Write a program to implement switch case in C++.

23. Write a program to implement for loop, while loop and do-while loop in C++.
24. Write a program to enter record of 50 students.
25. Write a program to implement call by value.
26. Write a program to show call by reference in C++.
27. Write a program to create structure in C++.
28. Write a program to find the area of circle, rectangle and polygon by using structure.
29. Write a program to create classes in C++.
30. Write a program that uses a class where the member functions are defined inside a class.
31. Write a program that uses a class where the member functions are defined outside a class.
32. Write a program to demonstrate the use of static data members.
33. Write a program to demonstrate the use of keyword const data members.
34. Write a program using constructors in C++.
35. Write a program using destructors in C++.
36. Write a program using multiple constructors in C++.
37. Write a program using Copy constructor in C++.
38. Write a program to demonstrate the single inheritance.
39. Write a program to demonstrate the multilevel inheritance.
40. Write a program to demonstrate the multiple inheritances.
41. Write a program showing hierarchal inheritance in C++.
42. Write a program to implement function overloading.
43. Write a program to demonstrate the overloading of binary arithmetic operators.
44. Write a program showing operator overloading in C++.
45. Write a program to demonstrate the use of function template.
46. Write a program to demonstrate the use of class template.
47. Write a program showing Exception handling in C++.
48. Write a program to read and write data from a file in C++.
49. Write a program to demonstrate the reading and writing of mixed type of data.
50. Write a program to demonstrate the reading and writing of object

Course Title: S/W Lab-IV (Data Structures)

Course Code: BCA205

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Identify the time and space complexity of the data structures.
2. Summarize the searching and sorting techniques.

3. Implement the stack, queue and linked list operation.
4. Search the trees such as binary search trees and splay trees and graphs.
5. Analyze the elementary sorting algorithms such as Selection sort, Bubble sort, Insertion sort, and Shell sort and Searching techniques.

Course Content

1. Write a program to insert an element into an array
2. Write a program to delete an element from an array.
3. Write a program to implement linear search algorithm
4. Write a program to implement binary search algorithm
5. Write a program to implement bubble sort algorithm.
6. Write a program to implement selection sort algorithm.
7. Write a program to implement PUSH operation in stacks.
8. Write a program to implement POP operation in stacks.
9. Write a program to implement Queues.
10. Write a program to insert an element in the beginning of the link list.
11. Write a program to insert an element in the middle of the link list.
12. Write a program to insert an element in the end of the link list.
13. Write a program to delete an element from the beginning of the link list.
14. Write a program to delete an element from the end of the link list.
15. Write a program for implementation of a graph.
16. Write a program for implementation of binary search tree.

Course Title: S/w Lab-V (Web designing using ASP .NET)

Course Code: BCA206

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Learn about the language of web: HTML/CSS.
2. Analyze a web page and identify its elements and attributes.
3. Create web pages using HTML and Cascading Style Sheets.
4. Build dynamic web pages using JavaScript.
5. Develop a fully functioning website and deploy on a web server.

Course Content

1. Design the page with an attractive background color, text color and background image.
2. Write an HTML document with an example of Table format to print your Bio-Data.
3. Write an HTML document with an example of Table format to print your Telephone Bill and your CV.

4. Develop a complete web page using Frames and Frameset.
5. Write an HTML code for designing the subscription form of mail account in the e-mail website with appropriate fields.
6. Write an example of Style Sheet.
7. Mini Project 1(Using HTML and CSS)
8. How to use Glyphicons Component ,Bootstrap Dropdown Menu Component, Button Groups and Button Toolbar
9. How to build a Responsive Navbar using Bootstrap, use of Carousel , Cards , Buttons
10. Mini Project 2 (Using Bootstrap)
11. Basics of Java Script, variable, if-else, Loop, Functions etc.
12. How to turn on off light in java script web page using html and JavaScript
13. Write a program for Student Grade Calculator in JavaScript
14. Write a program for Dynamic Clock in JavaScript
15. Build a Notes Taking Website Using Pure JavaScript

Course Title: Numerical Aptitude and Reasoning Ability

Course Code: BCA208

L	T	P	Credits
2	0	0	2

Total Hours: 30

Course Outcomes

On the completion of the course the students will be able to

1. Develop skill to meet the competitive examinations for better job opportunity.
2. Enrich their knowledge and to develop their logical reasoning thinking ability.
3. Analyze the Problems logically and approach the problems in a different manner.
4. Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
5. Acquire satisfactory competency in use of reasoning.

Course Content

UNIT I

7 hours

1. Quantitative Ability (Basic Mathematics): Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots ,Average , Problems on Ages ,Surds & Indices ,Percentages ,Problems on Numbers

UNIT II**7 hours**

1. Quantitative Ability (Applied & Engineering Mathematics): Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest, Time, Speed and Distance, Time & Work, Ratio and Proportion ,Area ,Mixtures and Allegation.

UNIT III**8 hours**

1. Data Interpretation: Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams.

UNIT IV**8 hours**

1. Logical Reasoning (Deductive Reasoning): Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, Calendars, Clocks, Venn Diagrams, Seating Arrangement, Syllogism, Mathematical Operations

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Aggarwal, R. S. (2000). *A Modern Approach to Verbal & Non Verbal Reasoning*. S. Chand.
- Carter, P. (2007). *IQ and aptitude tests*. Kogan Page Publishers.

Web Sources

- <http://www.theonlinetestcentre.com/numerical-ability.html>
- <https://www.jobtestprep.co.uk/free-numerical-reasoning-test>

Course Title: Introduction to Cloud Computing**Course Code: BCA209**

L	T	P	Credits
3	0	0	3

Total Hours: 45**Course Outcomes**

On the completion of the course the students will be able to

1. Gain insight about basic technology behind the Cloud.
2. Comprehend the Cloud computing applications.
3. Learn the models and services of cloud technology.
4. Accessing the cloud and system testing.
5. Learn to know the methodologies and technologies for the development of applications that will be deployed and offered through cloud computing environments.

Course Content**UNIT I****hours****12**

1. Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing.

UNIT II**10 hours**

1. Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

UNIT III**10 hours**

1. Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud,

UNIT IV**13 hours**

1. Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, selecting the right scalable application, Considerations for selecting cloud solution.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Aggarwal, R. S. (2000). *A Modern Approach to Verbal & Non Verbal Reasoning*. S. Chand.
- Carter, P. (2007). *IQ and aptitude tests*. Kogan Page Publishers.

Web Sources

- https://www.tutorialspoint.com/cloud_computing/cloud_computing_introduction.htm
- <https://www.youtube.com/watch?v=Q9zvgeOrTtw>
- <https://www.forbes.com/sites/forbestechcouncil/2020/06/05/what-is-cloud-computing-a-beginners-guide/?sh=40daa0ed77d7>
- <https://www.ibm.com/cloud/learn/cloud-computing-basics>
- <https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/>

Course Title: Fundamental of Information Security

Course Code: BCA210

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.

2. Gain familiarity with prevalent network and distributed system attacks, defences against them and forensics to investigate the aftermath.
3. Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today.
4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.
5. Design and develop security architecture for an organization.

Course Content

UNIT I 10 hours

1. Overview:-Concepts and definitions, needs and benefits of information security, Threats of information security, Information Security Management System (ISMS), Information Security Policy, Standards and Procedures

UNIT II 11 hours

1. Information Security Framework: Information security governance, Network Security implementation, Security incident management, Legal Framework, Security Standards and procedures, Requirements for Secure Communication.

UNIT III 10 hours

1. Technical Security Controls: Protection from malicious software, External services, Physical and environmental controls, Technical aspects.

UNIT IV 14 hours

1. Risk Management & Security Planning; Process overview, Risk analysis, Laws and customs, Information system risk analysis, System approach to risk management, Modes of risk analysis- effective analysis, qualitative analysis and value analysis.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Bishop Matt (2003). *Computer Security: Art and Science*, Addison-Wesley Professional.
- M. Kizza Joseph (2005). *Computer Network security*, Springer.
- Bishop Matt (2005). *Introduction to Computer Security*, Addison-Wesley Professional.
- R. Peltier Thomas (2001). *Information Security Risk Analysis*, CRC Press.

Web Sources

- <https://imagexmedia.com/blog/2017/05/understanding-fundamentals-information-security>
- <https://www.imperva.com/learn/data-security/information-security-infosec/>
- <https://www.w3schools.in/cyber-security/tutorials/>

SEMESTER-III

Course Title: Discrete Mathematics

Course Code: BCA301

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Implement the Logical and Algebraic operations.
2. Demonstrate the basic principles of relation in a set.
3. Solve the various methods of Recurrence relations.
4. Perform operations on sets, functions, relations, and sequences.
5. Apply algorithms and use of graphs and trees as tools to simplify Problems.

Course Content

UNIT I

14

hours

1. Set Theory: Introduction ,Sets and Elements, Subsets ,Venn Diagrams, Set Operations ,Algebra of Sets, Duality , Finite Sets, Counting Principle ,Classes of Sets, Power Sets, Partitions ,Mathematical Induction.
2. Relations: Introduction , Product Sets , Relations ,Pictorial Representatives of Relations ,Composition of Relations ,Types of Relations ,Closure Properties , Equivalence Relations ,Partial Ordering Relations
3. Functions: Introduction, Functions, One-to-One, Onto, and Invertible Functions, Mathematical Functions, Exponential and Logarithmic Functions.

UNIT II

16 hours

1. Combinations: Rule of products, permutations, combinations.
2. Algebra of Logic: Propositions and logic operations, truth tables and propositions generated by set, equivalence and implication laws of logic,

mathematical system, and propositions over a universe, mathematical induction, quantifiers.

UNIT III**14 hours**

1. Recursion and recurrence: The many faces of recursion, recurrence, relations, and some common recurrence relations, generating functions.

UNIT IV**16 hours**

1. Graph Theory: Introduction, Data Structures ,Graphs and Multigraphs ,Subgraphs, Isomorphic and Homeomorphic Graphs ,Paths, Connectivity , Traversable and Eulerian Graphs, Labeled and Weighted Graphs ,Complete, Regular, and Bipartite Graphs, Planar Graphs , Graph Colorings ,Representing Graphs in Computer Memory and Graph Algorithms. Directed Graphs, Sequential Representation of Directed Graphs, Warshall's Algorithm, Shortest Paths
2. Trees: Introduction, Binary Trees, Complete and Extended Binary Trees, Representing Binary Trees in Memory, Traversing Binary Trees, Binary Search Trees

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Epp, S. S. (2010). *Discrete mathematics with applications*. Cengage learning.
- Biggs, N. L. (2002). *Discrete mathematics*. Oxford University Press
- Ross, K. A., & Wright, C. R. (1985). *Discrete Mathematics*.Prentice-Hall,Inc.

Web Sources

- <https://www.javatpoint.com/discrete-mathematics-tutorial> h
- <https://www.geeksforgeeks.org/discrete-mathematics-tutorial/>
- https://www.tutorialspoint.com/discrete_mathematics/index.htm

Course Title: Operating Systems**Course Code: BCA302**

L	T	P	Credits
4	0	0	4

Total Hours: 60**Course Outcomes**

On the completion of the course the students will be able to

1. Describe the fundamental concepts of Operating System.

2. Solve the various types of Scheduling Algorithms for better utilization of external memory.
3. Knowledge about the mechanism of memory management in OS.
4. Attain the knowledge about deadlock detection algorithms.
5. Demonstrate the components and aspects of concurrency management.

Course Content

UNIT I

14 hours

1. Fundamentals of Operating system: Introduction to Operating system, Functions of an operating system. Operating system as a resource manager. Structure of operating system (Role of kernel and Shell). Views of operating system. Evolution and types of operating system.
2. Process & Thread Management: Program vs. Process; PCB, State transition diagram, Scheduling Queues, Types of schedulers, Concept of Thread, Benefits, Types of threads, Process synchronization.
3. CPU Scheduling: Need of CPU scheduling, CPU I/O Burst Cycle, Preemptive vs. Non-pre-emptive scheduling, Different scheduling criteria's, scheduling algorithms (FCFS, SJF, Round-Robin, Multilevel Queue).

UNIT II

16 hours

1. Memory Management: Introduction, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation; Virtual memory: basic concepts of demand paging, page replacement algorithms.

UNIT III

14 hours

1. I/O Device Management: I/O devices and controllers, device drivers; disk storage.
2. File Management: Basic concepts, file operations, access methods, directory structures and management, remote file systems; file protection.

UNIT IV

16 hours

1. Advanced Operating systems: Introduction to Distributed Operating system, Characteristics, architecture, Issues, Communication & Synchronization; Introduction Multiprocessor Operating system, Architecture, Structure, Synchronization & Scheduling; Introduction to Real-Time Operating System, Characteristics, Structure & Scheduling. Case study of Linux operating system.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Tanenbaum, A. (2009). *Modern operating systems*. Pearson Education, Inc.,
- Coffman, E. G., & Denning, P. J. (1973). *Operating systems theory* (Vol. 973). Englewood Cliffs, NJ: prentice-Hall.
- Madnick, S. E., & Donovan, J. J. (1974). *Operating systems* (Vol. 197, No. 4). New York: McGraw-Hill.
- Deitel, H. M. (1990). *An introduction to operating systems*. Addison-Wesley Longman Publishing Co., Inc..

Web Sources

- <https://www.guru99.com/operating-system-tutorial.html>)
- https://www.tutorialspoint.com/operating_system/os_overview.htm)
- <https://www.javatpoint.com/operating-systemand-Functions-javatpoint>
- <https://www.howtogeek.com/361572/what-is-an-operating-system/> (howtogeek.com)

Course Title: Digital Electronics**Course Code: BCA303**

L	T	P	Credits
3	0	0	3

Total Hours: 45**Course Outcomes**

On the completion of the course the students will be able to

1. Classify the fundamental concepts and techniques used in digital electronics.
2. Apply the principles of number system, binary codes and Boolean algebra to minimize logic expressions.
3. Knowledge about the difference of combinational and sequential circuits.
4. Identify the basic requirements for designing an application.
5. Analyze the various hazards in a digital design.

Course Content**UNIT I****15 hours**

1. Fundamental Concepts: Introduction to Analog and Digital Systems, Digital Signals, Basic Digital Circuits: AND, OR, NOT, NAND, NOR, XOR and XNOR gates. Boolean algebra Theorems, Characteristics of Digital IC.
2. Number Systems: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal, Base conversions, Binary arithmetic: Addition and Subtraction, 1's complement, 2's complement, subtraction using 1's complement and 2's complement.

UNIT II **15**
hours

1. Combinational Logic Design: SOP and POS Representation of Logic functions, K-Map representation and simplification up to 4 variable expressions, don't care condition.
2. Multiplexers: 4X1, 8X1 and 16X1. De-multiplexers: 1 to 4, 1 to 8 and 1 to 16. BCD to Decimal decoder, Decimal to BCD encoder. Parity generator and Parity checker. Design of Half adder and Full adder

UNIT III **15**
hours

1. Flip-Flops: Introduction, Latch, Clocked S-R Flip Flop, Preset and Clear signals, D-Flip Flop, J-K Flip Flop, The race-around condition, Master Slave J-K Flip Flop, D-Flip-Flop, Excitation Tables of Flip Flops. Edge-Triggered Flip Flops.

UNIT IV **15 hours**

1. A/D and D/A Converters: Introduction, Digital to Analog Converters: Weighted-Register D/A converter, R-2R Ladder D/A converter.
2. Analog to Digital Converters: Quantization and encoding, Parallel-comparator A/D converter, Counting A/D converter.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Jain, R. P. (2003). *Modern digital electronics*. Tata McGraw-Hill Education.
- Maini, A. K. (2007). *Digital electronics: principles, devices and applications*. John Wiley & Sons.
- Pedroni, V. A. (2008). *Digital electronics and design with VHDL*. Morgan Kaufmann.

- Balch, M. (2003). *Complete digital design: a comprehensive guide to digital electronics and computer system architecture*. McGraw-Hill Education.

Web Sources

- <https://www.javatpoint.com/digital-electronics>
- <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/>
- https://www.tutorialspoint.com/digital_circuits/index.htm
- <https://byjus.com/physics/digital-electronics/>

Course Title: Environmental Science

Course Code: BCA304

L	T	P	Credits
1	0	0	1

Total Hours: 15

Course Outcomes

On the completion of the course the students will be able to

1. Acquire the basic knowledge of Environment study.
2. Attain the information about ecosystem and its functioning.
3. Discuss the role of individuals in prevention of pollution.
4. Appreciate the ethical, cross-cultural, and historical context of the social issues of environmental, and the links between human and natural systems, environment.
5. Elaborate the role of information technology in the environment and the human health.

Course Content

UNIT I

4 hours

1. The Multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness.
2. Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.
 - a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
 - b) Water resources: Use and over-Utilization of surface and ground water, floods, drought, conflicts and water, dams-benefits and problems.
 - c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
 - d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
 - e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
 - f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT II**3 hours**

1. E-Concept of an ecosystem: Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.
2. Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

UNIT III**4 hours**

1. Environmental Pollution Definition: Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards, ill-effects of fireworks, Solid waste Management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV**4 hours**

1. Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Presentation and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation.
2. Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV / AIDS, Women and Child Welfare

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Agarwal K.C. (2001). *Environment Biology*, Nidi Publ. Ltd. Bikaner.
- Jadhav H & Bhosale (1995). *Environment Protection and Laws*, Himalaya Pub House, Delhi.

- Rao M.N. & Datta A.K. (1987). *Waste Water, Treatment* Oxford & IBH Publ. Co. Pvt. Ltd.

Web Sources

- <https://leverageedu.com/blog/multidisciplinary-nature-of-environmental-studies/>
- <https://study.com/learn/lesson/web-presence-overview-importance.html>

Course Title: S/W Lab-VI (Operating Systems)

Course Code: BCA305

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Get expertise on Unix OS platform.
2. Develop and debug C programs created on UNIX platforms.
3. Install the standard libraries of Operating System.
4. Classify the Shell Programming in Linux.
5. Perform the Text related commands.

Course Content

1. Write down the Steps to Install Linux Operating System.
2. Write down the Steps to Install XP Operating System.
3. Write and explain the File Related commands.
4. Write and explain the Directory Related commands.
5. Write and explain the Process and status information commands.
6. Write and explain the Text related commands.
7. Write and explain the command to set the File Permissions.
8. Write a shell Program for Numerical Calculations in Linux.
9. Write a shell program to create a table in Linux.
10. Write a shell program to identify Even and Odd Number in Linux.

Course Title: H/W Lab-VII (Digital Electronics)

Course Code: BCA306

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Compare analog and digital system.
2. Identify the various digital ICs and their operations.
3. Apply Boolean laws to simplify the digital circuits.
4. Design the various logic circuits.
5. Learn troubleshoot problems in digital circuits.

Course Content

1. To study the functions of basic logic gates and verify the truth table of AND, OR, NOT, XOR, NAND, NOR.
2. To study applications of AND, OR, NAND, XOR gates for gating digital signals.
3. To develop the different Arithmetic Circuits:
 - a. Half Adder and Subtractor
 - b. Full Adder and Subtractor
4. To study the BCD to binary and binary to BCD Code converter.
5. Study of Decoder Circuits: a. BCD to Decimal Decoder b. BCD to 7 Segment Decoder
6. Study of Encoder Circuits: a. BCD to Decimal Encoder b. Octal to Binary Encoder
7. To study the flip flop circuit using Gates: a. R S Flip Flop b. J K Flip Flop c. Bachelor Slave J K Flip Flop d. D Flip Flop
8. To study the R S & J K and D Flip Flop Using IC's
9. Study of Shift Register.
10. Study of Ring Counter.
11. Study of Asynchronous and Synchronous Counters.

Course Title: Institutional Training (4 weeks)

Course Code: BCA307

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Update oneself with all the latest changes in technological world.
2. Become master in one's specialized technology.
3. Communicate efficiently.
4. Analyze and understand the environment of the organization.
5. Develop to cognizance of the importance of management principles

Course Title: Digital Marketing

Course Code: BCA308

L	T	P	Credits
3	0	0	3

Course Outcomes

On the completion of the course the students will be able to

1. Develop strategies for online marketing.
2. Create effective email and social media campaigns.
3. Optimize websites for search engines.
4. Implement PPC advertising and affiliate marketing.
5. Analyze data and manage online reputation.

Course Content**UNIT I****12****hours**

1. Introduction to Digital Marketing Difference between Traditional Marketing and Digital Marketing, Benefits of using Digital Media, Inbound and Outbound Marketing, Online marketing POEM: (Paid, Owned, and Earned Media), Components of Online Marketing (Email, Forum, Social network, Banner, Blog), Impact of Online Marketing, Basics of Affiliate Marketing, Viral Marketing, Influencer Marketing, Referral Marketing.
2. Email Marketing: Email newsletters, Digests, Dedicated Emails, Lead Nurturing, Sponsorship Emails and Transactional Emails, Drawbacks of Email Marketing.
3. Social Media Marketing (SMM): Different types of Social Media Marketing like Facebook, LinkedIn, Twitter, Video, Instagram etc.

UNIT II**10 hours**

1. Search Engine Optimization (SEO) About SEO, Need of an SEO friendly website, Importance of Internet and Search Engines; Role of Keywords in SEO.
2. On-Page Optimization (Onsite): Basics of Website Designing / Development; HTML Basics for SEO; Onsite Optimization Basics; Website Structure and Navigation Menu Optimization; SEO Content Writing. Keywords Research and Analysis (eg. SWOT analysis of website, finding appropriate keywords).
3. Off Page Optimization: Introduction; Local marketing of websites depending on locations; Promoting Subsequent pages of the website. Introduction to organic SEO vs non-organic SEO; Social Media Optimization Techniques and Page Rank Technology

UNIT III**12 hours**

1. Website Planning & Creation Content Marketing Strategy: Goals and concepts, Strategic building blocks, Content creation & channel distribution, Tools of the trade, Advantages and challenges.
2. Keywords Research and Analysis: Introduction to Keyword Research; Business Analysis; Types of Keywords; Keywords Analysis Tools.
3. Web Presence: How to increase online presence and drive more traffic for a website, Search result visibility in search engines for chosen keyword and phrases, Using e-mail marketing to drive traffic for a website, Posting social media content for lead generation, Tools to create and manage content, Use of Blogging as content strategy.
4. Creating content: Writing and posting content on the web and in social networks, blog and video; Create, manage and implement a content marketing strategy; Monitoring and recording results to improve content marketing campaigns; Successful content marketing strategies and case studies

UNIT IV**11 hours**

1. Online Advertising, Mobile Marketing and Web analytics: Introduction to Online Advertising and its advantages, Paid versus Organic, Pay Per Click (PPC) Model. Basic concepts Cost per Click (CPC), CPM, CTR, CR etc. About Mobile Marketing, Objectives of Mobile Advertising, Creating a Mobile Marketing Strategy, Introduction to SMS Marketing. About Web Analytics, Types of Web Analytics (On-site, Off-site), Importance of Web Analytics

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Maini, A. K. (2007). *Digital electronics: principles, devices and applications*. John Wiley & Sons.
- <https://www.coursera.org/articles/digital-marketingrsera>

- Pedroni, V. A. (2008). *Digital electronics and design with VHDL*. Morgan Kaufmann.
- Balch, M. (2003). *Complete digital design: a comprehensive guide to digital electronics and computer system architecture*. McGraw-Hill Education.

Web Sources

- <https://www.investopedia.com/terms/d/digital-marketing.asp>
- https://www.tutorialspoint.com/digital_marketing_tutorials.htmlspo int.com
- <https://study.com/learn/lesson/web-presence-overview-importance.html>
- <https://mailchimp.com/marketing-glossary/digital-marketing/#:~:text=Digital%20marketing%2C%20also%20called%20online,messages%20as%20a%20marketing%20channel.>

Course Title: Electronic Devices

Course Code: BCA309

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Analyze PN junctions in semiconductor devices under various conditions.
2. Design and analyze simple rectifiers and voltage regulators using diodes.
3. Describe the behavior of special purpose diodes.
4. Implement circuit and test the performance.
5. Design and analyze simple BJT and MOSFET circuits.

Course Content

UNIT I **11**
hours

1. PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes.

UNIT II **10**
hours

1. NPN -PNP -Operations-Early effect-Current equations — Input and Output characteristics of CE, CB, CC – Hybrid -p model – h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

UNIT III **12**
hours

1. JFETs — Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage

-Channel length modulation, D-MOSFET, E-MOSFET- Characteristics — Comparison of MOSFET with JFET.

UNIT IV

12 hours

1. Metal-Semiconductor Junction- MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET, Schottky barrier diode-Zener diode-Varactor diode –Tunnel diode- Gallium Arsenide device, LASER diode, LDR.UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Reading

- Floyd, T. L. (2005). *Electronic devices*. Pearson Education India.
- Streetman, B. G., & Banerjee, S. (2006). *Solid state electronic devices* (Vol. 10). Upper Saddle River: Pearson/Prentice Hall.
- Bar-Lev, A. (1993). *Semiconductors and electronic devices*. Prentice-Hall, Inc...

Web Sources

- <https://www.geeksforgeeks.org/p-n-junction-diode/>
- <https://www.javatpoint.com/electronic-devices>
- <https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html>
- https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Ftmurphy.physics.ucsd.edu%2Fphys121%2Flectures%2F08_electronics.ppt&wdOrigin=BROWSELINK

Course Title: Digital Marketing

Course Code: BCA310

L	T	P	Credits
2	0	0	2

Total Hours: 30

Course Content

On the completion of the course the students will be able to

1. Develop strategies for online marketing.
2. Create effective email and social media campaigns.
3. Optimize websites for search engines.
4. Implement PPC advertising and affiliate marketing.
5. Analyze data and manage online reputation.

UNIT I

8 hours

1. Introduction to Digital Marketing Difference between Traditional Marketing and Digital Marketing, Benefits of using Digital Media, Inbound and Outbound Marketing, Online marketing POEM: (Paid,

Owned, and Earned Media), Components of Online Marketing (Email, Forum, Social network, Banner, Blog), Impact of Online Marketing, Basics of Affiliate Marketing, Viral Marketing, Influencer Marketing, Referral Marketing.

2. Email Marketing: Email newsletters, Digests, Dedicated Emails, Lead Nurturing, Sponsorship Emails and Transactional Emails, Drawbacks of Email Marketing.
3. Social Media Marketing (SMM): Different types of Social Media Marketing like Facebook, LinkedIn, Twitter, Video, Instagram etc.

UNIT II

6 hours

1. Search Engine Optimization (SEO) About SEO, Need of an SEO friendly website, Importance of Internet and Search Engines; Role of Keywords in SEO.
2. On-Page Optimization (Onsite): Basics of Website Designing / Development; HTML Basics for SEO; Onsite Optimization Basics; Website Structure and Navigation Menu Optimization; SEO Content Writing. Keywords Research and Analysis (eg. SWOT analysis of website, finding appropriate keywords).
3. Off Page Optimization: Introduction; Local marketing of websites depending on locations; Promoting Subsequent pages of the website. Introduction to organic SEO vs non-organic SEO; Social Media Optimization Techniques and Page Rank Technology

UNIT III

8 hours

1. Website Planning & Creation Content Marketing Strategy: Goals and concepts, Strategic building blocks, Content creation & channel distribution, Tools of the trade, Advantages and challenges.
2. Keywords Research and Analysis: Introduction to Keyword Research; Business Analysis; Types of Keywords; Keywords Analysis Tools.
3. Web Presence: How to increase online presence and drive more traffic for a website, Search result visibility in search engines for chosen keyword and phrases, Using e-mail marketing to drive traffic for a website, Posting social media content for lead generation, Tools to create and manage content, Use of Blogging as content strategy.

4. Creating content: Writing and posting content on the web and in social networks, blog and video; Create, manage and implement a content marketing strategy; Monitoring and recording results to improve content marketing campaigns; Successful content marketing strategies and case studies

UNIT IV

8 hours

1. Online Advertising, Mobile Marketing and Web analytics: Introduction to Online Advertising and its advantages, Paid versus Organic, Pay Per Click (PPC) Model. Basic concepts Cost per Click (CPC), CPM, CTR, CR etc. About Mobile Marketing, Objectives of Mobile Advertising, Creating a Mobile Marketing Strategy, Introduction to SMS Marketing. About Web Analytics, Types of Web Analytics (On-site, Off-site), Importance of Web Analytics

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Maini, A. K. (2007). *Digital electronics: principles, devices and applications*. John Wiley & Sons.
- <https://www.coursera.org/articles/digital-marketingrsera>
- Pedroni, V. A. (2008). *Digital electronics and design with VHDL*. Morgan Kaufmann.
- Balch, M. (2003). *Complete digital design: a comprehensive guide to digital electronics and computer system architecture*. McGraw-Hill Education.

Web Sources

- <https://www.investopedia.com/terms/d/digital-marketing.asp>
- https://www.tutorialspoint.com/digital_marketing_tutorials.htmlspo int.com)
- <https://study.com/learn/lesson/web-presence-overview-importance.html>
- <https://mailchimp.com/marketing-glossary/digital-marketing/#:~:text=Digital%20marketing%2C%20also%20called%20online,messages%20as%20a%20marketing%20channel.>

SEMESTER-IV**Course Title: Computer System Architecture****Course Code: BCA401**

L	T	P	Credits
4	0	0	4

Total Hours: 60**Course Outcomes**

On the completion of the course the students will be able to

1. Knowledge about the architecture of central processing unit.
2. Attain the knowledge of memory hierarchy.
3. Exemplify various data transfer modes.
4. Use the appropriate tools to design verify and test the architecture of microprocessor.
5. Know about the concepts of Memory mapping and Cache memory.

Course Content**UNIT I****14****hours**

1. Computer System Organisation: CPU Organisation, Instruction Execution (instruction cycle, types of instructions), RISC v/s CISC, Design Principles for Modern Computers, Instruction level parallelism. Processor level parallelism.
2. Primary memory: Memory addresses, Byte Ordering, Error-correcting codes, Cache memory. Secondary memory: Memory hierarchy, SCSI disk, RAID.

UNIT II**16 hours**

1. Instruction Set Architecture: Instruction formats, Expanding opcodes, types of addressing modes, data transfer and manipulation instructions, Program control(status-bit conditions, conditional branch instructions, program interrupt, types of interrupt).

UNIT III**14 hours**

1. Register Transfer Language: Register Transfer, Bus and memory transfer, Arithmetic micro operations, Logic micro-operations, Shift micro-operations, Arithmetic logic shift unit Micro-programmed control, control word, control memory (concepts only) .

UNIT IV**16 hours**

1. Input-output Organisation- I/O interfaces (I/O bus and interface modules, I/O versus memory bus, isolated versus memory-mapped I/O). Asynchronous Data transfer (strobe control, handshaking), modes of transfer (programmed I/O, interrupt-initiated I/O, software considerations), direct memory access.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Mano, M. M. (1993). Computer system architecture. Prentice-Hall, Inc.
- Balch, M. (2003). Complete digital design: a comprehensive guide to digital electronics and computer system architecture. McGraw-Hill Education.
- Parhami, B. (2005). Computer architecture. Oxford University Press, New York, NY, USA.

Web Sources

- <https://www.studytonight.com/computer-architecture/input-output-organisation>
- <https://www.javatpoint.com/computer-organization-and-architecture-tutorial>
- <https://429151971640327878.weebly.com/blog/13-computer-system-architecture>
- <https://www.geeksforgeeks.org/microarchitecture-and-instruction-set-architecture/>

Course Title: Database Management Systems

Course Code: BCA402

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Identify the difference about database systems from the file systems by enumerating their features.
2. Acknowledge the role of the database administrator.
3. Retain the knowledge about physical and logical database designs.
4. Learn about three level architecture of database system.
5. Converts an Entity-Relationship diagram to Relational Schema.

Course Content

UNIT I

14 hours

1. Introduction of DBMS: Data Modeling for a Database, Three level Architecture of DBMS, Components of a DBMS.
2. Introduction to Data Models: Hierarchical, Network and Relational Model, Comparison of Network, Hierarchical and Relational Model, Entity Relationship Model.

UNIT II

16 hours

1. Relational Database: Relational Algebra and Calculus, SQL Fundamentals, DDL, DML, DCL, PL/SQL Concepts, Cursors, Stored Procedures, Stored Functions, Database Triggers.

UNIT III

14

hours

1. Introduction to Normalization: First, Second, Third Normal Forms, Dependency Preservation, Boyce-Codd Normal Form, Multi-valued

Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Domain-key normal form (DKNF).

UNIT IV

16 hours

1. Database Recovery: Concurrency Management, Database Security, Integrity and Control. Structure of a Distributed Database, Design of Distributed Databases.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Ramakrishnan, R., Gehrke, J., &Gehrke, J. (2003). *Database management systems* (Vol. 3). New York: McGraw-Hill.KorthF. Henry. *Database System Concepts, McGraw Hill.*
- Lu, G. (1999). *Multimedia database management systems*. Boston: Artech House.
- Date, C. J. (1975). *An introduction to database systems*. Pearson Education India.

Web Sources

- <https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/>
- <https://www.javatpoint.com/dbms-tutorial>
- <https://www.techopedia.com/definition/24361/database-management-systems-dbms>

Course Title: Programming using PHP

Course Code: BCA403

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Implement the PHP basics i.e.web server, Text editor (Sublines, Dreamweaver).
2. Demonstrate about the concept of operators, Conditional and loops.
3. Develop the functional PHP script.
4. Design a My SQL database.
5. Introduce the creation of static webpage using HTML.

Course Content

UNIT I

12 hours

1. Introduction to PHP:PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other, technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP, Expressions,

scopes of a variable (local, global), PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator, PHP operator Precedence and associatively.

UNIT II **11**
hours

1. Handling HTML form with PHP: Capturing Form Data, GET and POST form Methods Dealing with multi value fields, redirecting a form after submission.
2. PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For and Do While Loop, Goto, Break, and Continue and exit

UNIT III **10 hours**

1. PHP Functions: Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local.

UNIT IV **12 hours**

1. String Manipulation and Regular Expression: Creating and accessing String, Searching & Replacing String, Formatting, joining and splitting String, String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Lerdorf, R., Tatroe, K., Kaehms, B., & McGredy, R. (2002). *Programming Php*. " O'Reilly Media, Inc."
- Lerdorf, R., Tatroe, K., & MacIntyre, P. (2006). *Programming Php*. " O'Reilly Media, Inc."
- Tatroe, K., & MacIntyre, P. (2020). *Programming PHP: Creating dynamic web pages*. O'Reilly Media

Web Sources

- <https://www.w3schools.com/php/>
- https://www.tutorialspoint.com/php/php_introduction.html
- <https://www.javatpoint.com/php-tutorial>

Course Title: S/W Lab-VIII (Programming using PHP)

Course Code: BCA404

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Discuss about the concepts of PHP scripting language for the development of Internet websites.
2. Imbibe the basic functions of My SQL database program.
3. Analyze the relationship between the client side and the server side scripts.
4. Develop a final project using the learned techniques.
5. Upload the Files on the server side using PHP.

Course Content

1. Create a basic web page to show use of head, title, and body tag.
2. Create a web page to show use heading and text formatting tags.
3. Create a web page to show use img, ul, ol and anchors.
4. Create a web page to show use tables and div tags.
5. Create a web page using class, id and inline styles.
6. Create a web page to create a form.
7. Create a web page to show an alert using java script.
8. Show the use of get Element by Id in java script.
9. Create a web page using variables, loop and Conditions in java script.
10. Create a web page using Switch in java script.
11. Create a web page to show use of j query.
12. Create a web page to implement get & post in ajax.
13. Create a web page to print your name using PHP.
14. Create a web page to show use of all data types in PHP
15. Create a web page to show use loops & Conditional Statements.
16. Create a web page to show use arrays in PHP
17. Create database and tables in My SQL.
18. Fetch and display data from My SQL table in a web page using PHP.
19. File uploads to server using PHP
20. Working with cookies and sessions.

Course Title: S/W Lab- IX (Workshop on Multimedia)

Course Code: BCA405

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Learn about the different tools for multimedia processing.
2. Draw the image with proper animation.
3. Design the images with appropriate tools from the toolbox.
4. Gain the practical knowledge of image animations.
5. Implement the experiments with graphics and text information.

Course Content

1. Procedure to create an animation to represent the growing moon.

2. Procedure to create an animation to indicate a wall bouncing on steps.
3. Procedure to simulate movement of a cloud.
4. Procedure to draw the fan blades and to give proper animation.
5. Procedure to display the background given through your name.
6. Procedure to create an animation with the following features:
WEL COME Letter should appear one by one. The fill Color of the text should change to a different Color after the display of full word.
7. Procedure to simulate a ball hitting another ball.
8. Procedure to create an animated cursor using STARTDRAG("SS",TRUE);
MOUSE. HIDE ();
9. Procedure to design a visiting card containing at least one graphic and text information.
10. Procedure to take a photographic image. Give title for the image and put the border. Write your names. Write the of institution and place.
11. Procedure to prepare a cover page for the book in your subject area. Plan your own design.
12. 12. Selecting your own background for organization.
13. Picture so that it given an elegant look.
14. Procedure to picture preferably on a plain background of a color of your choice-Positioning Includes rotation and scaling.
15. Procedure to remove the arrows and text from the given photographic image.
16. Procedure to type a word and apply the effects shadow embosses.
17. Procedure to use appropriate tools(s) from the toolbox cut the object from three files, organizes them in a single file and applies feather effects.
18. Procedure to display the background given through your name using mask.
19. Procedure to make anyone of one of the parrots black and white in a given picture.
20. Procedure to change a circle into a square using flash.

Course Title: S/W Lab-X (Database Management Systems)

Course Code: BCA406

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Solve the query of database using SQL DML / DDL commands.
2. Enforce integrity constraints on a database.
3. Apply the basic concepts of Database Systems and Applications.
4. Design a commercial relational database system (Oracle, My SQL) by writing SQL using the system.

- Analyze and Select storage and recovery techniques of database system.

Course Content

- Introduction to DBMS &SQL.
- To implement Various DDL comment.
- Implement the DML commands.
- Study of Various types of data Constraints and implementation.
- Study of all types of operators.
- Implement the concept of Set Operators.
- Explore select clauses -order by, having etc.
- Implement the concept of Inbuilt Function.
- Implement the concept of Joins,
- Implement the concept of views.
- Implement the concept of Indexes

Course Title: Cyber Law

Course Code: BCA407

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

- Analyse the concept of cybercrimes.
- Knowledge about the regulation of cyber space at national and international level.
- Describe the international legal regime related to cyber crimes.
- Discuss the offences and penalties under it act 2000.
- Discuss the scope of consumer protection in e-commerce.

Course Content

UNIT I

13 hours

- General introduction and Cyber space regulations: Cyber Space-Meaning and characteristics Need for regulation of cyber space, Cyber-libertarianism, Cyber-paternalism, Lessing's model of regulation, Regulators in cyberspace, Introduction to Internet, ACLU v Reno, Digitization and Society, Legal Challenges of the Information Society, Information Technology Act, 2000

UNIT II

10 hours

- Cyber law and IPR issues: Digital Copyrights, Open Source, Linking and caching, Digital Rights Management, DMCA, - Patents, Software Patents Trademarks and domain names, Brand identities, search engines and secondary market, ICANN, Database Right

UNIT III

10 hours

- Cyber law and privacy and taxations issues: Digitization, personal data and data industry, Data protection principles, Conditions for processing

of personal data, CCTV, RFID tracking, Data retention and identity - Taxation issues of e-commerce.

UNIT IV**12 hours**

1. Cyber Crimes: Computer misuse - identity theft, grooming and harassment, Hacking, Viruses, criminal damage and mail bombing, Denial of service attack, Obscenity, child abuse, Stalking. Morphing, web jacking, phishing etc., Cyber terrorism, Bandwidth theft, Convention on cyber crime

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Senthil, Surya and Devi Lakshmi (2010). *Manual of Cyber Laws*. New Delhi: Aditya Book Company.
- Singh, Ranbir and Singh Ghanshyam (2004). *Cyber Space and the Law: Issues and Challenges*, Hyderabad: Nalsar University.
- Karake-Shalhoub, Z., & Al Qasimi, L. (2010). *Cyber law and cyber security in developing and emerging economies*. Edward Elgar Publishing.

Web Sources

- <https://enhelion.com/blogs/2022/09/01/role-of-intellectual-property-in-cyber-law/>
- <https://www.britannica.com/topic/cybercrime>

Course Title: Ethical Hacking**Course Code: BCA408**

L	T	P	Credits
3	0	0	3

Total Hours: 45**Course Outcomes**

On the completion of the course the students will be able to

1. Evaluate new Hacking Methodology.
2. Install hacking software on a closed network environment.
3. Identify tools and techniques to carry out a penetration testing.
4. Exemplify security techniques used to protect system and user data.
5. Get knowledge about report writing and mitigation.

Course Content**UNIT I****12****hours**

1. Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, Foot printing and Scanning: Foot printing, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques

UNIT II**10 hours**

1. Hacking Methodology: Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

UNIT III**10 hours**

1. Web and Network Hacking: SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

UNIT IV**13 hours**

1. Report writing & Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting & high-level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Karake-Shalhoub, Z., & Al Qasimi, L. (2010). *Cyber law and cyber security in developing and emerging economies*. Edward Elgar Publishing.
- Palmer, C. C. (2001). Ethical hacking. *IBM Systems Journal*, 40(3), 769-780.
- Farsole, A. A., Kashikar, A. G., & Zunzunwala, A. (2010). Ethical hacking. *International Journal of Computer Applications*, 1(10), 14-20.

Web Sources

- <https://www.javatpoint.com/ethical-hacking#:~:text=Ethical%20hacking%20involves%20an%20authorized%20attempt%20to%20gain,hackers%20improve%20the%20security%20posture%20of%20an%20organization.>
- <https://www.bing.com/ck/a?!&&p=075f840600d8da28JmltdHM9MTY4MzUwNDAwMCZpZ3VpZD0yYzYwNzgyMS05YmI2LTY0ZDI0MDJmNi02OGJmOWEyZDY1NjkmaW5zaWQ9NTIwMw&pfn=3&hsh=3&fclid=2c607821-9bb6-64d2-02f6-68bf9a2d6569&psq=%e2%80%a2EthecaL+HACKIN&u=a1aHR0cHM6Ly93d3cuamF2YXRwb2ludC5jb20vZXRoaWNhbC1oYWNraW5n&ntb=1>

Name of Value Added Course: **Gender Equality****Course Outcomes:**

CO	On successful completion of this course, the students will able to:
CO1	Discuss the concept of gender equality and application under Indian laws.
CO2	Explain the constitutional safeguards and UCR related to gender equality in India.
CO3	Define the issues related to gender justice in India.
CO4	Examine the gender related crimes like child marriage, prostitution and trafficking.
CO5	Describe the various Gender Justice Issues- work, health and education.

UNIT-I

The Concept of Gender - the Biological Distinction

Constitutional Safeguards

Convention on Elimination of All Forms of Discrimination against Women

Protection of Women from Violence

UNIT-II

Gender Justice and Personal Laws

Adoption and Guardianship Rights

Property and Inheritance Rights

Rights of Maintenance

Uniform Civil Code towards Gender Justice

UNIT-III

Gender Related Crimes

Child Marriage

Prostitution and Trafficking

Female Feticide

Sexual Harassment of Women

UNIT- IV

Gender Justice Issues

Women and Work

Women and Health

Women and Education

- **Transactional Mode:** Video based Teaching, Collaborative Teaching, Cooperative Teaching; power point presentation.
- Tripathi S.C.(2008) "Law Relating to Women and Children", Central Law Publication, Allahabad.
- Chakrabarti,N.K (2007)"Gender Justice", R. Cambray and Company, Kolkata
- Jain, M.P,(2008) "Constitution of India", Wadhwa and Company, New Delhi

SEMESTER-V

Course Title: Computer Networks

Course Code: BCA501

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Get knowledge about the layers of the OSI model and TCP/IP.
2. Compare and identify various network topologies.
3. Identify the types of application process protocols.
4. Discuss the various data link layer and network protocols.
5. Classify the working of the Internet.

Course Content**UNIT I****14****hours**

1. Data communications concepts: Digital and analog parallel and serial synchronous and asynchronous, simplex, half duplex, full duplex, multiplexing.
2. Communication channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables, base band, and broadband, optical fiber transmission.

UNIT II**16 hours**

1. Wireless transmission: Microwave transmission, infrared transmission, laser transmission, radio transmission, and satellite transmission, Communication switching techniques; Circuit switching, message switching, packet switching.

UNIT III**14 hours**

1. Network reference models: Network topologies, OSI references model, TCP/IP reference model, comparison of OSI and TCI reference model. Data link layer design issue: Services provided to the network layer, framing, error control, flow control, HDLC, SDLC, data link layer in the internet (SLIP, PPP).

UNIT IV**16 hours**

1. MAC sub layer: CSMA/CD, IEEE standards, FDM, TDM, CDMA.
2. The Network Layer: Design Issues,
3. Routing Algorithms: Optimality principled, shortest path routing, Concept of Internet Working.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Tanenbaum, A. S. (2002). *Computer networks*. Pearson Education India.
- Peterson, L. L., & Davie, B. S. (2007). *Computer networks: a systems approach*. Elsevier.
- Kiesler, S. (1986). *The hidden messages in computer networks* (pp. 46-47). Harvard Business Review Case Services.

Web Sources

- <https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/>
- <https://www.studytonight.com/computer-networks/reference-models-in-computer-networks>
- <https://www.bing.com/ck/a?!&&p=2b949258678ed6ceJmltdHM9MTY4MzUwNDAwMCZpZ3VpZD0yYzYwNzgyMS05Yml2LTY0ZDItdMDJmNi02OGJmOWEyZDY1NjkmaW5zaWQ9NTIxMQ&ptn=3&hsh=3&fclid=2c607821-9bb6-64d2-02f6-68bf9a2d6569&psq=cOMPUTER+nETWORKS&u=a1aHR0cHM6Ly93d3cuamF2YXRwb2ludC5jb20vY29tcHV0ZXItbmV0d29yay10dXRvcmlhbA&ntb=1>

Course Title: Software Engineering**Course Code: BCA502**

L	T	P	Credits
4	0	0	4

Total Hours: 60**Course Outcomes**

On the completion of the course the students will be able to

1. Figure out the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction and deployment.
2. Review the techniques of software lifecycle.
3. Gain knowledge about DFDs, Entity Relationship diagrams etc.
4. Perform the various testing techniques.

5. Prepare the Documentation of Software Requirement Analysis (SRS).

Course Content

UNIT I **14**

hours

1. Software: Characteristics, Components, Applications
2. Software Process Models: Waterfall, Spiral, Prototyping, Fourth Generation Techniques, Concepts of Project Management, Role of Metrics & Measurements.

UNIT II **16**

hours

1. S/W Project Planning: Objectives, Decomposition techniques: S/W Sizing, Problem based estimation, Process based estimation
2. Cost Estimation Models: COCOMO Model, the S/W Equation.

UNIT III **14**

hours

1. System Analysis: Principles of Structured Analysis, Requirement analysis, DFD, Entity Relationship diagram, Data dictionary.
2. S/W Design: Objectives, Principles, Concepts, Design methodologies: Data design, Architectural design, procedural design, Object oriented concepts

UNIT IV **16 hours**

1. Testing fundamentals: Objectives, principles, testability, Test cases: White box & Black box testing.
2. Testing strategies: verification & validation, unit test, integration testing, validation testing, system testing

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Pressman S Roger (1992). *Software Engineering, A Practitioner's Approach*, Third Edition, McGraw Hill.
- Fairley E.R. (1985). *Software Engineering Concepts*, Mc Graw Hill.
- Jalota Pankaj (1992). *An Integrated Approach to Software Engineering*, Narosa Publishing House.

Web Sources

- <https://www.simplilearn.com/tutorials/devops->
- <https://www.geeksforgeeks.org/software-engineering-software-characteristics/>
- <https://www.bing.com/ck/a?!&&p=69e83b0e8aeb7214JmltdHM9MTY4MzUwNDAwMCZpZ3VpZD0yYzYwNzgyMS05YmI2LTY0ZDI0MDJmNi02OGJmOWEyZDY1NjkmaW5zaWQ9NTI3Ng&pfn=3&hsh=3&fclid=2c607821-9bb6-64d2-02f6->

68bf9a2d6569&psq=software+engineering&u=a1aHR0cHM6Ly93d3cu
Z2Vla3Nmb3JnZWVrcy5vcmcvc29mdHdhcmUtZW5naW5lZXJpbmcv&
ntb=1

Course Title: Introduction to Java
Course Code: BCA503

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Solve the computational problems using basic statements like if-else, control structures, array, and strings.
2. Knowledge about the user requirements for software functionality in Java programming language.
3. Run a software application using java programming language.
4. Know about basic principles of creating Java applications with Applet programming.
5. Develop a given program using the basic elements like Control and Conditional statements.

Course Content

UNIT I

14

hours

1. Introduction to Java: Introduction to java , Java History, Java Features; How Java Differs from C and C++; Comments in java, Java Program Structure, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements; Java Support Systems, Java Environment. Java Tokens; Java Statements

UNIT II

16

hours

1. Constants, Variables and Data Types: Introduction; Constants, Variables, Data Types, Introduction to Operators, Expressions, Operator Precedence. Decision Making, Branching and Looping: Decision making and branching Statements, Looping Statements, Labelled loops, Jumping Statements.

UNIT III

14

hours

1. Classes, Objects and Methods: Introduction, Defining a Class, Data member, member function, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Arrays, Strings, Vectors: Arrays, Jagged Arrays, Strings, String functions: Vectors, Wrapper Classes, Inheritance: Extending a Class, Overriding

Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.

UNIT IV

16 hours

1. Interfaces: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, Implementing Multiple Inheritance using Interfaces.
2. Packages: Introduction; System Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes.
3. Managing Errors and Exceptions: Introduction; Types of Errors; Exceptions, Exception Handling using Try, Catch and Finally block: Throwing Our Own Exceptions, Using Exceptions for Debugging.
4. Applet Programming: Introduction; How Applets Differ from Applications; Applet Life Cycle; Creating an Executable Applet

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Li, Y. (2022). Computer Software Java Programming Optimization Design. In *International Conference on Frontier Computing* (pp. 1086-1092). Springer, Singapore.
- Liang, Y. D. (2003). *Introduction to Java programming*. Pearson Education India.
- Liang, Y. D. (2018). *Introduction to Java programming and data structures*. Pearson Education.
- Kavka, C. (2003, October). Introduction to JAVA. In *Second Workshop on Distributed Laboratory Instrumentation Systems, ICTP, Trieste, Italy*.

Web Sources

- <https://www.javatpoint.com/java-tutorial>
- <https://www.geeksforgeeks.org/introduction-to-java/>
- <https://www.geeksforgeeks.org/interfaces-in-java/>
- <https://www.geeksforgeeks.org/classes-objects-java/>

Course Title: S/W Lab-XI(Java)

Course Code: BCA504

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Discuss about the concepts of object-oriented programming.
2. Test the performance of Exception handling and multi-threading.

3. Apply the concepts of packages to develop efficient and error free codes.
4. Implementing and Debugging the Java programs.
5. Develop a Applet code using Java Programming.

Course Content

1. Introduction to JAVA, Class, Object, Package, Applet
2. Write a Java programs which does the creation of Class and object.
3. Usage of import statement and package declaration in java programs.
4. Declaring variables of various data types and their effect by changing the access modifiers like private, public, protected, default.
5. Write a program which makes use of Comparison Operators.
6. Write programs which make use of Arithmetic Operator.
7. Write a program which makes use of Logical Operators.
8. Write a program which make use of control Statement like if, while, do while.
9. Write Java programs, which make use of Statement like Try, catch, finally.
10. Write a Java program, which make use of control Statement like Try, catch, finally, throw, and throws.
11. Write code snippets which make usage of Method Overloading, Using super, this, super (), this () in Java Programs.
12. Write code snippets which make usage of method Overriding.
13. Write code snippets which make Applet.
14. Write code snippets which make usage of recursion.
15. Write code snippets which make usage of Thread.
16. Write code snippets which make usage of Thread Synchronization.
17. Write code snippets which make usage of String Methods.
18. Write code snippets which make usage of Swing Package.

Course Title: Institutional Training (6 weeks)

Course Code: BCA505

L	T	P	Credits
0	0	6	3

Total Hours: 90

Course Outcomes

On the completion of the course the students will be able to

1. Update oneself with all the latest changes in technological world.
2. Become master in one's specialized technology.
3. Communicate efficiently.
4. Analyze and understand the environment of the organization.
5. Develop to cognizance of the importance of management principles

Course Title: S/W Lab-XII(Major Project)

Course Code: BCA506

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Update oneself with all the latest changes in technological world.

2. Become master in one's specialized technology.
3. Communicate efficiently.
4. Analyze and understand the environment of the organization.
5. Develop to cognizance of the importance of management principles

Course Content

1. Starting of Major Project (Feasibility Study, Requirement Analysis, Design)

2. Note: The marks distribution for the practical will be as under

- a. Viva Voce 10 marks
- b. System development 30

Course Title: Entrepreneurship Development

Course Code: BCA507

L	T	P	Credits
2	0	0	2

Total Hours: 30

Course Outcomes

On the completion of the course the students will be able to

1. Demonstrate the meaning, functions, types and roles of an entrepreneur and entrepreneurship.
2. Acquire information about the process, procedure and rules and regulations for setting up a new project.
3. Demonstrate knowledge about basics of entrepreneurial skills and competencies to provide the participants with necessary inputs for creation of new ventures.
4. Analyze entrepreneurial environment impacted by the social, economic, cultural & legal conditions.
5. Create entrepreneurial skills to form their own business or become an Entrepreneur.

Course Content

UNIT I

7

hours

1. Entrepreneur, Entrepreneurship and Enterprise: Concept and role in development characteristics of Entrepreneurs, Developments Entrepreneurial Competencies, Types of Enterprises and ownership, Charms of becoming an Entrepreneur.

UNIT II

8 hours

1. Reinforcing Entrepreneurial Motivation and Competencies. Creativity and innovation, problem solving, small scale industry (SSI) sector and its role in economic development: Economic, environment and small scale industries sector; Economic development through SSI.

UNIT III

8 hours

1. Role and contribution of SSI in domestic as well as international markets. Planning a small scale, enterprise, Schemes and assistance of support agencies; Banks, DIC, SFC, TCO, KVIC representatives.

UNIT IV**7 hours**

1. WTO and its impact on small sector industries, social responsibility of business. Achieving motivation training, perceiving a business opportunity, assessing project feasibility, preparing the preliminary project report (PPR).

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Parker, S. C. (2018). *The economics of entrepreneurship*. Cambridge University Press.
- Frederick, H., O'Connor, A., & Kuratko, D. F. (2018). *Entrepreneurship*. Cengage AU.
- Julien, P. A. (2018). *The state of the art in small business and entrepreneurship*. Routledge.
- European Commission. (2013). *Entrepreneurship 2020 action plan: Reigniting the entrepreneurial spirit in Europe*. Brussels, Belgium: European Commission.

Web Sources

- <https://www.studysmarter.us/explanations/business-studies/introduction-to-business/motivation-in-entrepreneurship/>
- <https://www.toppr.com/guides/business-environment/scales-of-business/small-scale>
- <https://byjus.com/commerce/entrepreneurship-development-process/>

Course Title: Big Data**Course Code: BCA508**

L	T	P	Credits
3	0	0	3

Total Hours: 45**Course Outcomes**

On the completion of the course the students will be able to

1. Discuss the building blocks of Big Data.
2. Articulate the programming aspects of cloud computing (map Reduce etc.).
3. Represent the analytical aspects of Big Data.
4. Knowledge about the recent research trends related to Hadoop File System, Map Reduce and Google File System etc.
5. Study different types Case studies on the current research and applications of the Hadoop and big data in industry

Course Content**UNIT I****14 hours**

1. Introduction to Big Data: Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error

UNIT II**09 hours**

1. Mining Data Streams: Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP)Applications – Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III**10 hours**

1. Hadoop Environment: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Hadoop filesystems- Java interfaces to HDFS- Basics-Developing a Map Reduce Application- How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features - Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration- Security in Hadoop

UNIT IV**12 hours**

1. Data Analysis Systems and Visualization: Link Analysis – Page Rank - Efficient Computation of Page Rank- Topic-Sensitive Page Rank – Link Spam- Recommendation Systems- A Model for Recommendation Systems- Content-Based Recommendations - Collaborative Filtering- Dimensionality Reduction- Visualizations - Visual data analysis techniques-interaction techniques- Systems and applications.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Chris Eaton, (2012). Dirk deRoos et al., *Understanding Big data*, McGraw Hill.
- Tom White, (2012). *HADOOP: The definitive Guide*, O Reilly.
- Hurwitz, J., Nugent, A., Halper, F., & Kaufman, M. (2013). *Big data for dummies* (Vol. 336). Hoboken, NJ: John Wiley & Sons.

Web Sources

- <https://www.javatpoint.com/what-is-big-data>
- <https://www.guru99.com/what-is-big-data.html>
- <https://www.geeksforgeeks.org/what-is-big-data/>

- <https://cloud.google.com/learn/what-is-big-data>

Course Title: Data Warehouse and Mining
Course Code: BCA509

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Identify the scope and necessity of Data Mining & Warehousing for the society.
2. Describe the designing of Data Warehousing so that it can be able to solve the root problems.
3. Get knowledge of various tools of Data Mining and their techniques to solve the real time problems.
4. Remove redundancy and incomplete data from the dataset using data preprocessing methods.
5. Develop a data mining application for data analysis using various tools.

Course Content

UNIT I

10 hours

1. Introduction: What is Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, and Major Issues in Data Mining. Data Preprocessing: Needs Preprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT II

12 hours

1. Data Warehouse and OLAP Technology: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture and Implementation, from Data Warehousing to Data Mining. Frequent Patterns, Associations Rules: Basic Concepts, Efficient and Scalable Frequent Item Set Mining Methods, Mining various kinds of Association Rules.

UNIT III

11 hours

1. Classification and Prediction: Introduction, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, and Rule based Classification, Classification by Back Propagation, Support Vector Machines, Prediction, Accuracy and Error Measures.

UNIT IV

12 hours

1. Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, and Grid Based Methods; Model Based Clustering Methods, Outlier Analysis.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching,

Collaborative Learning.

Suggested Readings

- Dunham Margaret H, Sridhar S. (2008). *Data mining: Introductory and Advanced Topics*, Pearson Education.
- Humphires H.D.(2009). *Data Warehousing: Architecture and Implementation* Pearson Education.
- Anahory M.(2008). *Data Warehousing in the Real World*. Pearson Education.

Web Sources

- <https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing>
- <https://www.ibm.com/topics/data-warehouse>
- <https://www.geeksforgeeks.org/difference-between-data-warehousing-and-data-mining/>
- <https://www.investopedia.com/terms/d/data-warehousing.asp>

SEMESTER-VI

Course Title: COMPUTER GRAPHICS

Course Code: BCA601

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations.
2. Knowledge about the techniques of clipping, three dimensional graphics.
3. Acknowledge the relation between the images displayed on screen.
4. Involve in various design activities such as testing, rendering, shading and animation.
5. Draw different shapes with the help of algorithms.

Course Content

UNIT I

16 hours

1. Input devices: Keyboard, Touch panel, light pens, Graphic tablets, Joysticks, Trackball, Data glove, Digitizers, Image scanner, Mouse, Voice & Systems.
2. Hard copy devices: Impact and non-impact printers, such as line printer, dot matrix, laser, ink, jet, electrostatic, flatbed and drum plotters.

UNIT II

14

hours

1. Video Display Devices: Refresh cathode ray tube, raster scan displays, random scan displays, color CRT, monitors, direct view storage tube, flat,

panel displays; 3,D viewing devices, raster scan systems, random scan systems, graphics monitors and workstations.

2. Scan conversion algorithms for line, circle and ellipse, Bresenham's algorithms, area filling techniques, character generation.

UNIT III

16

hours

1. 2D Graphics: Cartesian and Homogeneous coordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Two-dimensional viewing transformation and clipping (line, polygon and text).

UNIT IV

14 hours

1. 3D Graphics: Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Mathematics of Projections (parallel & perspective). 3,D viewing transformations and clipping.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Hearn, D., Baker, M. P., & Baker, M. P. (2004). *Computer graphics with OpenGL* (Vol. 3). Upper Saddle River, NJ:: Pearson Prentice Hall.
- Foley, J. D., Van Dam, A., Feiner, S. K., Hughes, J. F., & Phillips, R. L. (1994). *Introduction to computer graphics* (Vol. 55). Reading: Addison-Wesley.
- Shirley, P., Ashikhmin, M., & Marschner, S. (2009). *Fundamentals of computer graphics*. AK Peters/CRC Press.
- Foley, J. D., Van, F. D., Van Dam, A., Feiner, S. K., Hughes, J. F., & Hughes, J. (1996). *Computer graphics: principles and practice* (Vol. 12110). Addison-Wesley Professional.

Web Sources

- <https://www.javatpoint.com/computer-graphics-tutorial>
- <https://www.geeksforgeeks.org/introduction-to-computer-graphics/>
- <https://www.coursera.org/articles/computer-graphics>

Course Title: PROGRAMMING USING PYTHON

Course Code: BCA602

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Understand the variables, expressions and statements.
2. Apply conditional and looping constructs.
3. Design and import functions in python programming.

4. Learn the basics of Strings and Dictionaries.

5. Utilize basic operations on File.

Course Content

UNIT I

16

hours

1. Introduction to Python Getting Started: Introduction to Python- an interpreted high level language, interactive mode and script mode.
2. Variables, Expressions and Statements: Values, Variables and keywords; Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements (Assignment statement); Taking input (using raw_input() and input()) and displaying output(print statement);Putting Comments

UNIT II

14 hours

1. Conditional constructs and looping: if else statement While, For (range function), break, continue, else, pass, Nested loops, use of compound expression in conditional constructs and looping
2. Functions: Importing Modules (entire module or selected objects), invoking built in functions, functions from math module, using random () and randint() functions of random module to generate random numbers, composition.
3. Defining functions, invoking functions, passing parameters, scope of variables, void functions and functions returning values, flow of execution.

UNIT III

14

hours

1. Strings: Creating, initializing and accessing the elements; String operators: +, *, in, not in, range slice [n:m]; Comparing strings using relational operators; String functions & methods: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitle, partition, replace, join, split, count, decode, encode, swapcase, Pattern Matching.
2. Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations (joining, list slices); List functions & methods: len, insert, append, extend, sort, remove, reverse, pop
3. Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, traversing, appending, updating and deleting elements. Dictionary functions & Methods: cmp, len, clear(), get(), has_key(), items(), keys(), update(), values()

UNIT IV

16 hours

1. Tuples: Immutable concept, creating, initializing and accessing the elements in a tuple; Tuple functions:cmp(), len(), max(), min(), tuple()
2. Input and Output: Output Formatting, Reading and Writing Files

3. Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Predefined Clean-up Actions.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Guttag, J. V. (2013). *Introduction to computation and programming using Python*. Mit Press.
- Guttag, J. V. (2016). *Introduction to computation and programming using Python: With application to understanding data*. MIT Press.
- Langtangen, H. P., &Langtangen, H. P. (2011). *A primer on scientific programming with Python* (Vol. 1). Berlin/Heidelberg: Springer.

Web Sources

- <https://www.toppr.com/guides/computer-science/programming-withpython/tuples/immutabletuples/#:~:text=These%20tuples%20are%20an%20ordered,can%20call%20them%20immutable%20tuples.>
- https://www.w3schools.com/python/gloss_python_join_lists.asp
- <https://www.w3schools.com/python/>
- <https://www.geeksforgeeks.org/python-programming-language/>

Course Title: BASICS OF RESEARCH

Course Code: BCA603

L	T	P	Credits
4	0	0	4

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Recognize the function and significance of research in computer applications.
2. Understand the fundamentals of research methodology and the issues that affect it.
3. Identify the concepts and procedures of sampling, data collection, analysis and reporting
4. Analyze appropriate research problem and parameters.
5. Put basic research principles and procedures into practice.

Course Content

UNIT I hours

14

1. Introduction : Objectives of Research, Research Types, Research Methodology, Research Process – Flow chart, description of various steps, Selection of research problem.

UNIT II**16 hours**

1. Methods of Data Collection: Types of data collection and classification, Observation method, Interview Method, Collection of data through Questionnaires, Schedules.
2. Processing and Analysis of Data: Editing, Coding, Classification of data, Statistical measures and their significance: Central tendencies, Variation, Skewness, and Kurtosis. Correlation and Regression, Multiple Regression, Time Series Analysis, Parametric tests (t, z and F), Chi Square test. Analysis of Variance, One - way ANOVA Factor Analysis, Centroid Method, Computer simulations using MATLAB/SPSS.

UNIT III**14****hours**

1. Probability Distributions: Binomial, Poisson, Exponential, Normal distributions, Frequency distribution, Cumulative Frequency distribution, Relative Frequency distribution.
2. Sampling Methods: Different methods of Sampling: Probability Sampling methods, Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling. Non-Probability Sampling methods, Sample size.

UNIT IV**16 hours**

1. Testing of Hypotheses: Testing of Hypotheses concerning Mean(s), Testing of Hypotheses concerning Proportion(s), Testing of Hypotheses concerning Variance(s)
2. Report Writing and Presentation: Types of reports, Report Format– Cover page, Introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Montgomery, D. C.(2017). *Design and analysis of experiments*. John wiley& sons.
- Montgomery, D. C., &Runger, G. C. (2007). *Applied statistics and probability for engineers, (With CD)*. John wiley& sons.

- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
- Krishnaswamy, K. N., Sivakumar, A. I., & Mathirajan, M. (2006). *Management research methodology: Integration of principles, methods and techniques*. Pearson Education India.
- Chawla, D., & Sodhi, N. (2011). *Research methodology: Concepts and cases*. Vikas Publishing House.

Web Sources

- <https://indiafreenotes.com/meaning-objectives-of-research/>
- <https://www.cuemath.com/data/hypothesis-testing/>
- <https://www.scribbr.com/category/research-process/>
- <https://ccsuniversity.ac.in/bridge-library/pdf/MPhil%20Stats%20Research%20Methodology-Part1.pdf>

Course Title: S/W Lab-XIII(Computer Graphics)
Course Code: BCA604

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Apply mathematics and logic to develop Computer programs for elementary graphic operations
2. Implement the Flood Fill Algorithm.
3. Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics
4. Develop the competency to understand the concepts related to Computer Vision and Virtual reality
5. Apply the logic to develop animation and gaming programs

Course Content

1. Write a program to plot a pixel.
2. Write a Program to Draw a Line.
3. Write a Program to Draw a Circle.
4. Write a program to draw ellipse.
5. Write a program to draw arc.
6. Write a program to illustrate the functions `setfillstyle()`, `setcolor()`, `setbkcolor()`, `floodfill()` using inbuilt functions
7. Write a program to draw a HUT using various inbuilt functions.
8. Write a program to draw a line by using direct method algorithm.
9. Program to Implement DDA Line Algorithm.
10. Draw a Line Using 'Brenham's Line Algorithm'.
11. Draw a Circle Using 'Brenham's Circle Drawing Algorithm'.

12. Write a program to draw a Circle by using Polynomial Method.
13. Write a Program to Draw a Mid-Point of Circle.
14. Write a Program for Flood Fill Algorithm.
15. Write a program to implement 2D Translation.
16. Write a program to implement 2D Scaling
17. Write a program to implement 2D Rotation about origin
18. Mini Project :-Moving Car

Course Title: S/W Lab-XIV (PROGRAMMING USING PYTHON)

Course Code: BCA605

L	T	P	Credits
0	0	4	2

Total Hours: 60

Course Outcomes

On the completion of the course the students will be able to

1. Write, Test and Debug Python Programs.
2. Implement Conditionals and Loops for Python Programs.
3. Use functions and represent Compound data using Lists.
4. Implement the basic conditional and looping constructs.
5. Write the code to implement Lists Data Structure.

Course Content

PROGRAM 1: Hello World

PROGRAM 2: Add numbers and Concatenate strings

PROGRAM 3: Input from user

PROGRAM 4: Loops

PROGRAM 5: If-Else - Conditional Checking

PROGRAM 6: Functions

PROGRAM 7: Math library

PROGRAM 8: Strings

PROGRAM 9: Exceptional Handling

PROGRAM 10: Random Numbers/String

PROGRAM 11: Demo of Data Structure - List

PROGRAM 12: Demo of Data Structure - Dictionary

PROGRAM 13: Demo of Data Structure – Tuple

PROGRAM 14: Command Line Argument

Course Title: Community Based Field Project

Course Code: BCA606

L	T	P	Credits
0	0	8	4

Total Hours: 120

Course Outcomes

On the completion of the course the students will be able to

1. Apply community development principles.
2. Demonstrate research skills.
3. Develop community engagement strategies.
4. Identify and analyze community needs.
5. Create and implement a community-based project.

Course Title: Artificial Intelligence

Course Code: BCA607

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Solve the basic AI based problems.
2. Knowledge about propositional logic.
3. Analyze the MYCIN expert system.
4. Apply AI techniques to real-world problems to develop intelligent systems.
5. Discuss the concept of Artificial Intelligence.

Course Content

UNIT I

12 hours

1. Introduction: What are AI, Importance of AI, and Early work in AI, Applications of AI, Knowledge and its definition? Knowledge Representation: Propositional logic, FOPL, Properties of Well-formed formulas, Conversion to Clausal form, Inference rules.

UNIT II

10 hours

1. Structured Knowledge: Introduction, Associate frame structures, Conceptual dependencies and scripts.
2. Knowledge Organization and Manipulation: Concepts, Uninformed or Blind search, Pattern Recognition, Recognition Classification process, Classification patterns.

UNIT III

13 hours

1. Expert System: Definition, Rule based architecture, Knowledge acquisition and validation, MYCIN Expert System.

UNIT IV

10 hours

1. Knowledge Acquisition: Types of learning, General Learning model, Performance measures.

Transactional modes

Project based learning, Team Teaching, Flipped teaching, Open talk, Collaborative Teaching, Case Analysis, Panel Discussions, Group Discussions.

Suggested Readings

- Winston, P. H. (1992). Artificial intelligence. Addison-Wesley Longman Publishing Co., Inc..Winston, P. H. (1984). Artificial intelligence.

Addison-Wesley Longman Publishing Co., Inc..

- Boden, M. A. (Ed.). (1996). Artificial intelligence. Elsevier.
- Hunt, E. B. (2014). Artificial intelligence. Academic Press.

Web Sources

- https://www.vssut.ac.in/lecture_notes/lecture1428643004.pdf
- [https://mrcet.com/downloads/digital_notes/IT/\(R17A1204\)%20Artificial%20Intelligence.pdf](https://mrcet.com/downloads/digital_notes/IT/(R17A1204)%20Artificial%20Intelligence.pdf)
- https://www.cet.edu.in/noticfiles/271_AI%20Lect%20Notes.pdf

CourseTitle: Soft Computing

Course Code: BCA608

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Knowledge about soft computing techniques and their applications.
2. Analyze various neural network architectures.
3. Describe perceptions and counter propagation networks.
4. Classify the fuzzy systems.
5. Analyze the genetic algorithms and their applications.

Course Content

UNIT I

12

hours

1. Neural Networks: Introduction to neural networks, working of an artificial neuron, linear severability, perception, perception training algorithm, back propagation algorithm, Adelines and Madelines.

UNIT II

11

hours

1. Learning: Supervised and unsupervised learning, counter-propagation networks, adaptive resonance theory, recognition and bidirectional associative memory.

UNIT III

12 hours

1. Fuzzy Logic:Introduction to fuzzy logic and fuzzy sets, fuzzy relations, fuzzy graphs, fuzzy arithmetic and fuzzy if-then rules, Applications of fuzzy logic, neuro-fuzzy systems.

UNIT IV

10 hours

1. Probabilistic Reasoning: Introduction to probability theory, conditional probability, Baye's theorem, fuzzy logic and its relationship with probability theory.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Mehrotra Kishan, Chilkuri K. Mohan and Sanjay Ranka(2007). *Elements of artificial neural networks*.
- H. Hassoun Mohammad (2007). *Fundamentals of artificial neural networks*, Prentice Hall of India, Edition.
- Kosko Bart (2007). *Neural networks and fuzzy systems*, Prentice Hall of India.
- Yen John and Langari Reza (2007). *Fuzzy logic, intelligence, control and information*, Pearson Education.
- R. Spiegel Murray, Schiller John and Srinivasan R. Alu (2007). *Probability and statistics*, Schaum's Outlines, Tata McGraw Hill Publishing Company Limited.

Web Sources

- <https://www.geeksforgeeks.org/neural-networks-a-beginners-guide/>
- <https://www.javatpoint.com/probabilistic-reasoning-in-artificial-intelligence>
- <https://www.geeksforgeeks.org/fuzzy-logic-introduction/>
- <https://www.elprocus.com/soft-computing/>

Course Title: Android Programming**Course Code: BCA609**

L	T	P	Credits
3	0	0	3

Total Hours: 45**Course Outcomes**

On the completion of the course the students will be able to

1. Install Android Studio and Cross Platform Integrated Development Environment.
2. Discuss about designs of User Interface and Layouts for Android App.
3. Implement intents to broadcast data within and between Applications.
4. Use Content providers and Handle Databases using SQLite.
5. Introduce Android APIs for Camera and Location Based Service.

Course Content**UNIT I****10****hours**

1. Introduction Android: Android Versions, Features of Android, Architecture of Android Obtaining the Required Tools, Android SDK, Installing the Android SDK Tools Configuring the Android SDK Manager – Eclipse, Android Development Tools (ADT), Creating Android Virtual Devices (AVDs), Creating Your First Android Application – Types of Android Application , Anatomy of an Android Application.

UNIT II**12 hours**

1. Activities: Fragments and Intents Understanding Activities, Creating Activities, Linking Activities Using Intents, Resolving Intent Filter

Collision , Returning Results from an Intent, Passing Data Using an Intent Object, Fragments, Adding Fragments Dynamically, Life Cycle of a Fragment, Interactions between Fragments, Calling Built-In Applications Using Intents, Understanding the Intent Object, Using Intent Filters – Adding Categories, Displaying Notifications.

UNIT III**12 hours**

1. Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface Programmatically, Listening for UI Notifications, Designing Your User Interface With Views, Using Basic Views, Using Picker Views, Using List Views to Display Long Lists, Understanding Specialized Fragments – Displaying Pictures And Menus With Views, Using Image Views to Display Pictures – Using Menus with Views, Additional Views.

UNIT IV**11 hours**

1. Databases: Content Providers and Messaging Saving and Loading User Preferences, Persisting Data to Files, Creating and Using Databases, Content Providers, Sharing Data in Android, Using a Content Provider, Creating Your Own Content Providers, Using the Content Provider – Messaging, SMS Messaging, Sending E-mail.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Mednieks, Z. R., Dornin, L., Meike, G. B., & Nakamura, M. (2012). *Programming android*. " O'Reilly Media, Inc."
- Horton, J. (2015). *Android programming for beginners*. Packt Publishing Ltd.
- Milette, G., & Stroud, A. (2012). *Professional Android sensor programming*. John Wiley & Sons

Web Sources

- <https://www.javatpoint.com/dbms-tutorial>
- <https://medium.com/android-hunger/android-app-components-activities-fragments-and-intents-ed7373455555>
- <http://www.dre.vanderbilt.edu/~schmidt/android/android-4.0/out/target/common/docs/doc-comment-check/guide/topics/ui/index.html>
- <https://www.geeksforgeeks.org/fragment-lifecycle-in-android/>

Course Title: Theory of computation**Course Code: BCA610**

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Outcomes

On the completion of the course the students will be able to

1. Recognize and comprehend formal reasoning languages.
2. Use basic concepts of formal languages of finite automata techniques
3. Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
4. Analyze Context Free languages, Expression and Grammars.
5. Design different types of Push down Automata as Simple Parser.

Course Content**UNIT I****11 hours**

1. Introduction: Basic Terminology: Alphabet, Formal Language and operations on formal languages, Examples of formal languages.
2. Finite automata : Concept of Basic Machines, Properties and Limitations of Finite State Machines, Deterministic Finite Automata(DFA), Non-Deterministic Finite Automata(NFA), Equivalence of DFA and NFA , Non-Deterministic Finite automata with Λ -Transitions.

UNIT II**12****hours**

1. Regular expression: Regular Languages and Regular Expressions, Kleen's Theorem. Arden's Method.
2. Properties of Regular sets: The Pumping Lemma for Regular sets, Application of the Pumping Lemma, Closure Properties of Regular Sets, Myhill- Nerode Theorem and Minimization of Finite Automata, Minimization Algorithm.
3. Finite Automata with output: Moore and Mealy Machines. Equivalence of Moore and Mealy Machines.

UNIT III**11 hours**

1. Context Free Grammars: Examples and Definitions, Derivation trees and ambiguity, An Unambiguous CFG for Algebraic Expressions. Regular Grammar, Simplified forms and Normal forms: Removal of useless symbols and unit production, Removal of Λ -moves, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).
2. Pushdown Automata: Introduction and Definition of Push-Down Automaton, Applications of Push down Automata

UNIT IV**11 hour**

1. Turing Machines: Definitions and Examples, Deterministic and Non-Deterministic Turing Machines, Unsolvable Problems: A Non recursive Language and an Unsolvable Problem, PCP Problem and MPCP Problem.
2. More General Languages and Grammars: Recursively Enumerable and Recursive Languages, Unrestricted grammars, Context sensitive Language and grammar. Relation between languages of classes, Chomsky hierarchies of grammars.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Sipser, M. (1996). Introduction to the Theory of Computation. *ACM Sigact News*, 27(1), 27-29.
- Kozen, D. C. (2006). *Theory of computation* (Vol. 121). Heidelberg: Springer.
- Martin, J. C. (2022). *Introduction to Languages and the Theory of Computation*.

Web Sources

- <https://www.geeksforgeeks.org/introduction-of-theory-of-computation/>
- <https://www.javatpoint.com/automata-tutorial>
- <https://www.tutorialspoint.com/what-is-the-theory-of-computation>
- https://www.w3schools.com/ai/ai_history_computers.asp